Ontario

Advisory Council on Occupational Health and Occupational Safety

Seventh Annual Report
April 1, 1984 to March 31, 1985

85-6575/

Mandate and Objectives

The function of the Advisory Council is and it has power to*:

a) make recommendations to the Minister of Labour relating to programs of the ministry in occupational health and occupational safety; and
b) advise the minister on matters relating to occupational health and occupational safety which may be brought to its attention or be referred to it.

To achieve this Council has set the following objectives:

Primary Objective
To advise the Minister of Labour on all matters relative to occupational health and safety in Ontario.

Secondary Objectives
1. To ensure as far as possible that the policies and programs in occupational health and safety effectively minimize the risks to health and safety in all workplaces in Ontario.
2. To ensure as far as possible that knowledge about occupational health and safety is available to management, labour and the public and that it is understood by them.
3. To assist in promoting and establishing mechanisms involving management and labour to solve problems in occupational health and safety.
4. To ensure as far as possible that there is appropriate manpower training and development for the occupational health and safety field.
5. To review periodically the effectiveness of the policies and programs implemented to achieve objectives 1 to 4. **

*The Occupational Health and Safety Act s 10(7).
**added June, 1980.

Advisory Council on Occupational Health and Occupational Safety

Seventh Annual Report April 1, 1984 to March 31, 1985

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15th Floor,
Toronto, Ontario
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Ontario

Advisory Council on Occupational Health & Occupational Safety

Conseil consultatif de la santé et de la sécurité au travail

Office of the Chairman

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May 1985

The Honourable Robert G. Elgie, M.D.,
Minister of labour
400 University Avenue, 14th Floor
TORONTO, Ontario
M7A 1T7

Dear Dr. Elgie:

I have the honour to submit the Seventh Annual Report of the Advisory Council on Occupational Health and Occupational Safety for the fiscal year 1984-85.

Respectfully,

D. R. McCalla
Chairman

Encl.

Advisory Council on Occupational Health and Occupational Safety
Members and Officers 1984-85

R.T. Boldt (1985)
Dow Chemical Canada, Inc.
Sarnia

N. Caldbick (1986)
Housewife
Timmins

J.W. Charters (1985)
Steel Company of Canada
Hamilton

W. Curlook† (1986)
Inco Ltd.
Toronto

D. Dewees (1987)
University of Toronto
Toronto

J. Duffy (1985)
Provincial Bldg. & Const. Trades Council
Don Mills

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Fisher Farms
Burlington

J. Gill (1985)
United Automobile Workers
North York

L. Heard (1986)
United Steelworkers of America
Toronto

E. Kaegi (1987)
C-I-L
North York

D.R. McCalla (1987)‡
(Chairman)
McMaster University
Hamilton

T.H. Meagher (1986)
Ontario Federation of Labour
Don Mills

J.M. More (1984)
Energy & Chemical Workers Union
Oakville

W.K.C. Morgan (1986)
University of Western Ontario
London

H.D. Moyer (1986)
General Motors of Canada
Oshawa

T. O'Connor (1986)
Canadian Union of Public Employees
Scarborough

P.L. Rooney (1986)
The Algoma Steel Corp. (retired)
Sault Ste. Marie

D.B. Smith* (1987)
Ellis-Don Ltd.
London

C.J. Tuohy (1985)
(Vice-Chairman)
University of Toronto
Toronto

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London

E.A. Waddell (1985)
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Don Mills

J.S. Warner*** (1986)
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Toronto

V. Biggar
Executive Assistant

K.M. Caverhill
Research Officer
(to January 1985)

P.L. Chan
Research Officer

A.J. Koven
Project Officer

G. Perry
Research Officer

N.R. Subramanian
Administrative Assistant

Members' terms expire(d) on October 31 of the year indicated in parentheses

* *Appointed March 12, 1985*
** *Appointed November 1, 1984*
*** *Appointed October 1, 1984*
† *Resigned from council September 30, 1984*
‡ *January 31*

Preface

The introductory section of last year's annual report outlined some of the directions for council's future work against a backdrop of past introductory themes and council's past activities. In the Introduction to this seventh annual report, the survey of joint health and safety committees in Ontario, a major council undertaking that is now underway is discussed in more detail.

The next main section of the annual report presents four advisory memoranda including 28 recommendations to the minister on the following topics:

- council's review of the process used in the development of standards for benzene and acrylonitrile and council's evaluation of the criteria used to assess the hazard of benzene and acrylonitrile exposure in the workplace;
- reproductive hazards in the workplace;
- policies and priorities for dealing with literacy and occupational health and safety.

The minister's replies follow the appropriate advisory memoranda. In the minister's response to council's review of the process used in the development of the benzene regulation (Advisory Memorandum 84-I) the minister sought council's comments regarding the establishment of multipartite advisory committees to aid in the development of designated substance regulations. In council's reply (which is found in this report together with correspondence relating to Advisory Memorandum 84-I), along with its comments, council made reference to the fact that it is currently considering criteria and alternative strategies for controlling hazardous substances in the workplace. Advice from council on these other topics is expected to be forwarded to the minister in the coming year.

The next section of the annual report sets out follow-up correspondence relating to previous advisory memoranda.

Council's Scientific Task Force on Talc has submitted its report. The full text of that report – *Report of Committee to Review Certain Questions Concerning the Health Effects of Fibrous Dust Particles in Talc* is also included in council's seventh annual report. The talc task force was established by council as a result of a request by the minister for advice on that topic, and was to report directly to the minister.

Referring to increasing commercial application and interest in the use of biotechnology, the minister requested council's advice on policies and procedures that should be established by the ministry to ensure the health and safety of workers as the use of biotechnology increases. It is council's intention to organize a small workshop as a means of gathering information to assist it in assessing whether there is a need for action regarding biotechnology and/or a role for council in providing advice on the establishment

of policies and procedures. Council's correspondence with the minister on this subject is included under 'Other Correspondence'.

Also during the 1984-85 year the Minister of Labour asked the advisory council to give consideration to whether there was a role for council to pursue the issue of alcohol and drug problems in the workplace. In its deliberations council recognized that the issue of drug and alcohol abuse is an important one. Though elements of the problem have relevance to occupational health and safety, it is part of a much broader societal problem with aspects that fall within the purview of a wide range of organizations and government ministries. Council is grateful to the concerned individuals with whom it met and had the opportunity to discuss this matter. However, although council will follow with interest any related activities in which the minister may be involved, council did not feel it should take up the issue for more direct or extensive consideration at this time.

Other areas in which council expects to offer advice to the minister in the coming year relate to the implementation of the *Occupational Health and Safety Act* and to the classification of biomedical surveillance procedures in the workplace.

As in previous years, the final section contains administrative matters. The advisory council is governed by section 10 of the *Occupational Health and Safety Act*, which has been reproduced in full for easy reference. The council's objectives and terms of reference are also set out in this section as well as dates of council meetings and the terms of reference, membership and meeting dates of its task forces.

An appendix at the end of the report contains a variety of statistics, including the number and frequency rate of compensated occupational fatalities, major disabilities, injuries and illnesses, and days lost for compensated temporary total disability. Council is grateful to the Strategic Planning Unit, Occupational Health and Safety Division, Ministry of Labour, and to the Canadian Centre for Occupational Health and Safety for the provision of these statistics this year.

Council is indebted to the invaluable assistance of the noncouncil members of council's task forces and technical advisory committee for the survey of joint health and safety committees in Ontario, who have been appointed to contribute their expertise on particular issues. Council also expresses its gratitude for the support and co-operation it has received from members of labour and management and from private and public associations and agencies, including educational institutions. Without their continuing support council would not be in a position to fulfil its responsibilities.

Mr. John More retired from council, on the expiry of his term, after seven years of invaluable service. Dr. Walter Curlook resigned from council during the past year. Council very much regrets their departure and thanks them for their contribution.

Three new members joined council in 1984/85. Council is pleased to welcome Dr. Stuart Warner, Mr. Daniel Ublansky and Mr. Douglas Smith.

Mrs. Elizabeth Harney, on educational leave from council staff, decided to remain in Quebec. Her valued contribution to council's past work was greatly appreciated. Thanks, and congratulations on the birth of a daughter, are extended to Ms. Karen Caverhill, who served on council staff.

INTRODUCTION

An Introduction to the Survey of Joint Health and Safety Committees in Ontario

In the Introduction to its third annual report, the advisory council discussed the issue of participation as an approach to occupational health and safety. This discussion arose as a result of a meeting in Thunder Bay, Ontario between council and approximately 60 union and management representatives from the forest products and the pulp and paper industries in the region. Council's prime objective in organizing the meeting was to try to assess the degree of participation at the level of the joint health and safety committees. It was noted that while workers were now participating to a greater extent than before in health and safety programs, it was also apparent that the level of participation was not yet satisfactory for many of those involved and that it varied considerably from plant to plant. The advisory council concluded that a useful future project could involve a survey to determine the number of committees established across the province and to assess the effectiveness of these committees.

There is little empirical evidence in Ontario or elsewhere on either the effectiveness of joint health and safety committees or the attributes of committees that contribute to their effectiveness. The studies that have been completed all have methodological limitations of one kind or another. They also demonstrate a marked tendency to focus attention on describing and discussing, in general terms, the factors that influence the effectiveness of committees rather than evaluate whether, and to what extent, committees are, in fact, effective.

Other Jurisdictions

During the past decade, in many western industrialized countries, reforms in government legislation and policies have begun to stress the importance of ensuring active participation of workers in the planning and implementation of occupational health and safety programs. Western countries that have laws requiring some degree of worker participation in health and safety matters include Sweden, Norway, Denmark, Finland, West Germany, France, Belgium, the Netherlands, Austria, the United Kingdom and the United States. The growth of joint labour-management health and safety committees within Canadian workplaces can be viewed in the larger context of this growing trend towards industrial democracy.

The Swedish government was among the first to recognize that an active, informed work force may be the best safeguard against occupational accidents and diseases. Rather than emphasize government intervention through a centralized and complex regulatory system, Sweden relies heavily upon the participation of workers at both the local and national levels to improve workplace health and safety, and the safety committee system is a central feature of worker participation in reducing occupational risk. Workplaces with 50 or more employees have health and safety committees comprised of both management and labour representatives, with the majority being from labour. Committees monitor and evaluate such issues as the means to reduce occupational disease and accidents, the planning of new facilities

and worker training in health and safety. They also supervise the work of company health services. While there has been a lack of formal evaluation of the contribution of joint health and safety committees towards improving the health and safety of workers, Kasperson[1] notes that the perceptions of the various labour, management and government officials whom he interviewed in Sweden were that worker participation generally had contributed substantially to an improved work environment. Perceived usefulness, however, and effectiveness as judged by objective criteria are different things, with the latter being much more difficult to measure.

Kochan, Dyer and Lipsky[2] in the U.S. were among the first researchers to explore the dynamics of joint labour/management industrial health and safety committees. The study was based on interviews with union members of joint health and safety committees from the International Association of Machinists and management members from the same plants. Although the results of this study cannot be directly applied to the Canadian industrial scene, the authors found that mere compliance with the legislation was insufficient as a basis for effective committee operation. While both management commitment and rank and file involvement were principal determinants of successful problem solving, the attitudes and the expressed policies of senior management in particular were major determining factors for ensuring effective and viable joint work site committees. A further U.S. study by Boden *et al*[3] attempted to determine if the existence of a joint health and safety committee was correlated either with the number of Occupational Safety and Health Administration (OSHA) complaints or with hazards as measured by OSHA serious citations. Virtually no effect could be detected in the 127 Massachusetts manufacturing firms surveyed. At a sub-sample of 13 firms, interviews with joint health and safety committee members were conducted, and committee attributes and perceptions about committee effectiveness were compared with the number of OSHA complaints and serious citations. There were fewer complaints and fewer serious citations at firms in which committees were perceived as effective. The results of the study suggested that the objective attributes of the committee may be less important to its success than the commitment of management and labour in solving workplace health and safety problems. Committees may facilitate occupational health and safety programs where a supportive environment exists, but may have little or no impact in situations where they are only formalities.

In the United Kingdom, while health and safety committees are not a new development, the passage of the 1974 *Health and Safety at Work Act*[4] and the 1977 *Safety Representatives and Safety Committee Regulations*[5] initiated a rapid expansion of both the number of committees throughout British industry and the types of firms that might be expected to have committees. In a study aimed at clarifying the nature of an effective health and safety committee and identifying the major characteristics that lead to such effectiveness, Beaumont, Coyle, Leopold and Schuller[6] conducted an interview survey of committee members in 48 manufacturing plants. They interviewed five members of the joint health and safety committee from each workplace and compared members' perceptions of the effectiveness of their committee with the change, over time, in accident rates in the plant. Results indicated that the most effective committees were in the high accident rate industries. These committees were more active and were more able to get things done. Committee members in high risk industries were more likely to have received

health and safety training. There also appeared to be a greater commitment from senior management to address time, effort and money to resolving health and safety problems, and the possibility of involving the workplace as a whole in resolving such problems was greater. Conversely, where there was less inherent risk in a workplace, attitudes and motivation towards health and safety were found to be less well developed. Other factors that Beaumont *et al* found that seemed to be important to safety committee effectiveness and that were within members' control were: regular meetings, tiered structure in large plants, equal opportunity to choose agenda items, presence of senior management, well-trained members, regular attendance of all members and two-way communication with the work force.

One Canadian study that attempted to assess the effectiveness of mandatory committees was conducted by the Alberta government in 1978.[7] The salient feature of this study, which was modelled after that conducted by Kochan *et al*, was the reliance on the opinions and perceptions of the committee co-chairmen as the principle source of information for assessing the effectiveness of committees. Interviews were conducted with each of the co-chairmen (i.e. one representing labour and one representing management) from 36 randomly selected committees. The study was conducted only eight months after a joint health and safety committee system had been established in the province and, although the results must be judged in light of the fact that the survey was conducted in workplaces that did not have extensive experience with committees, does contain some useful information. Overall, the majority of the committee co-chairmen stated that, taking everything into account, they were satisfied with their committees. Labour as well as management representatives were of the opinion that committees had been successful in improving both the health and the safety conditions in their workplaces. In addition, about three-quarters of the co-chairmen agreed that their committees had had some positive impact on general labour/management relations.

One useful Canadian source of information about joint health and safety committees is the data bank set up by the Saskatchewan government as part of its support system for mandatory committees in that province.[8] Saskatchewan was, in 1972, the first Canadian province to require workplace joint health and safety committees and as part of this initiative, the Occupational Health and Safety Branch set up a program to indirectly monitor the activities of committees. The summarized data that resulted offer some potentially useful insights into the actions and effectiveness of committees. In analysing these data, Bryce and Manga[9] concluded that, although it remains for more comprehensive and exhaustive studies to prove, they believed that the Saskatchewan data provided strong evidence that joint health and safety committees were effective. Clarke[10] also concluded that the Saskatchewan experience suggested that committees can play a major role in workplace health and safety.

The Report of the Ontario NDP Task Force on Occupational Health and Safety[11] also agrees that, if the objectives of the Internal Responsibility System could be accomplished, the work of the health and safety committees would be fundamentally important in achieving internal co-operation to resolve health and safety problems. The task force reported, however, that direct violations of the legislated procedures in many workplaces hampered

or prevented the effective functioning of committees. It also felt that management disregard for the committees' concerns was the major impediment to cleaning up the workplace. Where faced with an unco-operative management, committees had too little power to achieve the changes necessary to improve the health and safety of workers. Submissions to the task force generally supported the findings of the U.S. studies, i.e. that the support of senior management was an essential factor in determining how effective a joint health and safety committee may be in solving workplace health and safety problems.

Ontario

In the 1970s the Ontario government initiated a process of consolidation and re-evaluation of the numerous statutes relating to occupational health and safety in the province. As a result, the *Occupational Health and Safety Act*[12] was promulgated in 1978 to be administered by the Occupational Health and Safety Branch of the Ministry of Labour. In line with the recommendations made by the Ham commission[13], the central theme of the Act was that the relationships between the various participants in the workplace should be based on a system in which employers and workers must share responsibility for occupational health and safety and must both actively seek to identify hazards and develop ways to protect workers. The increased statutory requirements were therefore designed to encourage self-regulation rather than regulation from outside. One of the main elements of the Internal Responsibility System was the inclusion of an enhanced role for workers in dealing with workplace health and safety issues. The major instrument for realizing this goal was to be the joint health and safety committee.

The Ham commission considered the essential role of the joint health and safety committees to be that of providing a consultative forum for constructive and critical review of the status of the health and safety of workers. It was to be a forum of consultation between those with the ability to contribute and those accountable for deciding what should be done. The commission felt that the committee's greatest contribution would be in terms of contributive responsibility, i.e. providing individual and collective insight, advice and judgement.

Prior to 1978, joint health and safety committees in Ontario had been established on a voluntary basis, often by collective agreement. These voluntary committees, which were mainly in larger unionized workplaces, had a limited and variable success. Giving evidence before the Ham commission, for example, the United Steelworkers reported good, bad and indifferent experience with voluntary committee arrangements, the outcome depending on such factors as general labour/management relations, the extent of management's concern for health and safety, and the economic position of the company. Similarly, the Finn Inquiry into Health and Safety in Grain Elevators[14] reported 'there seems to be a wide variation in the success with which these committees have discharged their functions and in the attitude of management to their operations.'

During 1977-78, the Research Branch of the Ontario Ministry of Labour undertook a small exploratory survey of voluntary joint health and safety committees in the province with a view to examining some of the factors

contributing to committees' effectiveness. The majority of the 77 committees surveyed were in large or medium-sized unionized manufacturing firms. Of these, 33 committees were assessed on the perceptions of their members regarding the effectiveness of their committee. The majority of those interviewed, from both the worker and management 'sides' of the committees, felt that their committees were operating reasonably effectively and that the committees were having some positive impact on the health and safety of workers in their establishment. Factors identified by the survey as contributing to committee effectiveness were: overall industrial relations climate; priority given to occupational health and safety by parties in the workplace; knowledge and training of committee members; access to information; regularity and frequency of participation; the financial conditions of the company; and the conditions of buildings and equipment.

In 1978, joint health and safety committees were mandated in Ontario for workplaces having 20 or more workers and those workplaces having fewer than 20 workers where designated substance regulations apply. (Section 8(1) of the Act lists the exemptions from this general requirement.) The rights, duties and responsibilities of committees were set out in the legislation, and all voluntary committees were required to come into line with the legislation. The central theme of joint responsibility was emphasized by the Ministry of Labour's *Guide to the Occupational Health and Safety Act*, where it was stated:

> 'Fundamental to the Act is the concept that employers and workers must share responsibility for occupational health and safety and that both must actively seek to identify hazards and develop responses to protect workers. This Internal Responsibility System assumes assessment of the system itself by employers and workers through the appointment of health and safety committees and representatives and through regular inspections of the workplace.'[15]

With a limited number of personnel to inspect the estimated 170,000 workplaces in the province, the ministry saw the Internal Responsibility System and the joint committees as essential tools in ensuring compliance with the legislation.

Given that the *Occupational Health and Safety Act* has now been in place for over six years, it was felt to be an opportune time to conduct a comprehensive survey of joint health and safety committees in Ontario. It will be the largest study of its kind to date, and is expected to include approximately 3,000 committees from randomly chosen workplaces in the industrial, public and mining sectors across the province. The survey sample will be stratified according to type of workplace, size of work force, and whether or not the work force is unionized. Workplaces of fewer than 20 workers to which a designated substance regulation applies will also be included. The twofold purpose of the survey is to determine how well joint health and safety committees are working in Ontario and to identify factors that may contribute to, or detract from, their effectiveness in improving workplace health and safety. Similar, but separate, questionnaires have been designed for the worker and management components of the committees in order to obtain the independent views of both groups.

In order to ensure that the questionnaire is relevant to the everyday functioning and problems of joint health and safety committees, a Technical Advisory Committee has been established, made up of members having practical experience of serving on, or working with, joint health and safety committees in the workplace. The Technical Advisory Committee has worked closely with the outside consultant who has been retained to design and administer the questionnaire.

The Survey of Joint Health and Safety Committees in Ontario is a major study that will address the functioning and effectiveness of committees. The results of the survey will be of importance to everyone who is interested in improving health and safety in the workplace. They may also pinpoint avenues for future study.

Footnotes

1 Kasperson, R.E. Worker Participation in Protection: The Swedish Alternative. *Environment*. Vol.25, n.4, May 1983, pp.13-20, 40-43.
2 Kochan, T.A., Dyer, L. and Lipsky, D.B. The Effectiveness of Union-Management Safety and Health Committees. Sept.1977, W.E. Upjohn Institute for Employment Research.
3 Boden, L.I., Hall, J., Levensteine, C. and Punnett, L. The Impact of Health and Safety Committees. J. of Occ. Med., Vol.26, No.11, Nov.1984.
4 1974, ch.37. [See Legislative Series (Geneva-ILO) 1974, UK-2].
5 Statutory Instruments, 1977, no.500. [See Legislative Series (Geneva-ILO) 1977, UK-1].
6 Beaumont, P.B., Coyle, J.R., Leopold, J.W. and Schuller, T.E. The Determinants of Effective Joint Health and Safety Committees. University of Glasgow, Centre for Research in Industrial Democracy and Participation 1982.
7 The Government of Alberta. An Initial Review of the Joint Work Site Health and Safety Committee Program in Alberta. Aug.1978, a working paper of the Research and Education Branch, Occupational Health and Safety Division, Alberta Worker's Health, Safety and Compensation.
8 The statistics on Saskatchewan are supplied by the Occupational Health and Safety Division of the Saskatchewan Department of Labour.
9 Bryce, G.K. and Manga, P. The Effectiveness of Health and Safety Committees, *Industrial Relations*, Vol.40, no.2, 1985.
10 Clarke, R.D. Worker Participation in Health and Safety in Canada. Int. Labour Review, Vol.121, No.2, March-April 1982.
11 Martel, E. Not Yet Healthy, Not Yet Safe, Report of the Task Force on Occupational Health and Safety of the Ontario New Democratic Party, 1983.
12 The Occupational Health and Safety Act, R.S.O. 1978, c.321.
13 The Government of Ontario, Report of the Royal Commission on the Health and Safety of Workers in Mines (Ham report), James M. Ham, Commissioner (Toronto: Ministry of the Attorney General, 1976.)
14 Report of the Commission of Inquiry into Health and Safety in Grain Elevators; Canada, Department of Labour, 1976 p.97.
15 Ontario Ministry of Labour. A Guide to the Occupational Health and Safety Act, 1978, Ontario Government Publication, p.28.

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March 12, 1984

Dr. D. R. McCalla
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Dear Dr. McCalla:

As you know on November 13, 1982 I published a Notice of Intent to designate Benzene along with seven other substances. On July 30, I published a proposed regulation for Benzene in the Ontario Gazette. Following public comment, my officials presented a revised Benzene Regulation to interested parties at an open review meeting held on October 11, 1983. Since then my officials have been reviewing the comments that were made at that meeting and subsequently in briefs submitted to the Minister. As a result, I enclose a copy of the revised Benzene Regulation and my officials' "Report to the Advisory Council on the designation of Benzene in Ontario".

I look forward to receiving Council's comments on the consultative process followed by my officials in developing the proposed regulation and codes for Benzene.

Officials of the Occupational Health and Safety Division would be pleased to meet with Council members to discuss this matter at your earliest convenience.

Yours sincerely,

R. H. Ramsay
Minister

Encl.

Ontario

Advisory Council on Occupational Health & Occupational Safety

Office of the Chairman

400 University Avenue
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416 965 2448

June 6, 1984

Dr. A. E. Robinson
Assistant Deputy Minister
Occupational Health & Safety Division
400 University Avenue, 14th Floor
Toronto, Ontario

Dear Dr. Robinson:

Further to the meeting of the ACOHOS Task Force on Benzene and the ministry on May 29, 1984, I am writing to ask for information on a point that escaped attention earlier. In setting some previous standards for carcinogenic materials (vinyl chloride and asbestos) the ministry justified the level chosen on the basis of a risk analysis that showed such a level to be associated with a risk of 50 excess tumors per 100,000 exposed workers per year - a value consistent with a risk deemed to be acceptable by the International Commission on Radiological Protection.

We now note that the limit chosen for benzene represents, by the ministry's own calculation, a risk of 100 excess tumors per 100,000 workers per year - a value two times higher than previously accepted. Further, no explanation is provided for this increase in acceptable risk. Council's discussions on the subject would be considerably assisted if you could provide us with an explanation and justification for what appears to be a major inconsistency between the approach used with benzene and that used with vinyl chloride and asbestos.

Since Council intends to discuss the proposed benzene regulation at its June meeting, a response prior to June 12 would be most helpful.

Yours sincerely,

D. R. McCallum

D. R. McCallum
Chairman

Ontario Ministry of Labour
Ministère du Travail de l'Ontario

Occupational Health and Safety Division

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June 12, 1984

Dr. D. R. McCalla
Chairman
Advisory Council
Occupational Health and
Occupational Safety
15th Floor
400 University Avenue
Toronto, Ontario

Dear Dr. McCalla:

Thank you for your letter of June 6, 1984 raising a further issue to those considered at the meeting between the ACOHOS Task Force on Benzene and the Ministry on May 29, 1984.

Your letter notes that the five ppm limit for benzene "represents a risk of 100 excess tumours to 100,000 workers per year which is a value two times higher than previously accepted". You indicated that no explanation was provided for this increase in acceptable risk. I would note that the Ministry has made no reference to "acceptable risk" and that the use of that term and concept have been avoided deliberately. The health effects document provided to the Advisory Council and widely critiqued during the consultative process simply provides an objective review of the health effects data and includes an assessment of risk.

As noted during the May 29, 1984 meeting, the exposure value for benzene was set out in the first draft regulation at one ppm as a 40 hour time weighted average. This was based on the health effects document, which contained an analysis of the available data. A one ppm value, derived from the risk assessment, was selected on the basis of comparison with the risk experienced by workers in other industries which are generally perceived as being "safe"; it is consistent with the ICRP approach.

As was set out in the health effects document and the background material provided to Council, the risk analysis was conducted on very limited data which have many shortcomings and consequently the confidence limits around the risk estimate are wide (0.4 to 4.9 ppm). In addition, the Ministry made several conservative assumptions in deriving the model used to calculate the estimated risk.

As Ministry officials noted at the meeting with you there were a number of considerations which led the Ministry to change the proposed value to read "...as low as reasonably practical with the view to achieving 1 ppm but in any case not to exceed the maximum of 5 ppm". For technological, safety, and economic reasons a one ppm limit does not appear to be feasible or practical at this time. In arriving at the proposed limit the Ministry did consider health effects implications but it is incorrect to assume that the Ministry selected the 5 ppm limit based on a risk analysis and a comparison with the risk associated with "safe" industry. On the contrary, the proposed value emerged as a result of the consultative process and the Ministry's evaluation of all the information so acquired.

I trust that this explanation assists the Council in its review of the benzene regulation.

Yours sincerely,

Ann E. Robinson, Ph.D., F.C.I.C.
Assistant Deputy Minister

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July 26, 1984

The Honourable R.H. Ramsay
Minister of Labour
400 University Avenue, 14th Floor
TORONTO, Ontario
M7A 1T7

Dear Mr. Ramsay:

On behalf of the Advisory Council, I am enclosing Advisory Memorandum 84-I in which council reviewed the process for the development of the benzene regulation in light of the policies and principles set out in Advisory Memorandum 78-II.

Unlike the previous advisory memoranda on council's review of the process used to develop standards for designated substances, this memorandum contains specific recommendations. Council hopes that these will help the ministry to improve the process of standard setting. We recognize that some of the issues and recommendations in this memorandum go beyond the benzene regulation and are relevant to the designation process in general. In due course many of these will be considered by the task force which council has recently established to consider criteria for designation and alternative strategies for control of harmful agents. However, since the designation of additional substances is in progress, we believe that some comment is needed now.

The Advisory Council is aware that there is confusion surrounding its role in the designation process. As in previous reviews of designated substance regulations, we have restricted our comments to the process by which the ministry developed the regulation. Council wishes to stress that its review should not be construed to be an endorsation of the level or appropriateness of the standard itself.

We hope that the comments, suggestions and recommendations included herewith are of use to you in the extraordinarily difficult task of developing regulations for the control of toxic substances.

Yours truly,

D. R. McCalla
Chairman

Encl.

cc to: T. E. Armstrong, Q.C.
Dr. A. E. Robinson
Mr. B. Goodman

Advisory Memorandum 84-I to the Minister of Labour July 26, 1984

A Review by the Advisory Council of the Process Used to Develop a Standard for Benzene and Council's Evaluation of the Criteria Utilized to Assess the Hazard of Benzene Exposure in the Workplace

The review of the standard setting process leading to the development of the benzene regulation focused on three aspects of the process: 1) the analysis of the background documentation (i.e. whether the ministry assembled, reviewed and analysed the available evidence in a reasonable fashion and whether the conclusions reached were compatible with the evidence), 2) the process (i.e. whether the public was provided with sufficient time, information and opportunity to comment on and participate in the development and content of the regulation), and 3) the application (i.e. whether the regulation and codes are internally consistent and whether the intent of the ministry is expressed in a clear and unambiguous fashion).

As in the past, the council has conducted the review considering the list of basic principles and procedures suggested in council's Advisory Memorandum 78-II.

BACKGROUND

On November 13, 1982, the notice of intention to designate benzene under section 22 of the *Occupational Health and Safety Act* was published in *The Ontario Gazette*. The notice also called for briefs and submissions on whether benzene should be designated. On July 21, 1983, the Legislative Review Committee of the Occupational Health and Safety Division recommended the regulation of benzene.

On July 30, 1983, a proposed regulation, related codes and a notice calling for briefs and submissions to be submitted within 30 days were published in *The Ontario Gazette*. Subsequently, the 30-day comment period was extended to September 16, 1983.

A revised version of the regulation and codes was presented, and the revisions were explained at a public meeting on October 11, 1983. Further public input occurred after the October public meeting; briefs were submitted and meetings or visitations were conducted.

Additional revisions were made before the regulation and codes were transmitted to the Advisory Council on Occupational Health and Occupational Safety on March 12, 1984. Council also received considerable background documentation including: information on properties and use of benzene, benzene standards in other jurisdictions, health effects studies, the risk analysis, a summary of the partial analysis of the economic impact, a compendium and analysis of the public comments in response to the publicized call for briefs and submissions, and an explanation of some of the changes.

On May 29, 1984, after an initial review of the revised regulation and the background documentation, task force members met with ministry officials to discuss the rationale used by the ministry to make some of the policy decisions. The agenda for the meeting and a summary of the responses are reproduced as Appendices I and II.

1. **Analysis of the Background Documentation**

a) *Health Effects*

In its review of the background information, council noted that the ministry has performed a thorough review of the literature on the health effects of benzene. The studies support the claim that benzene is a leukaemogen, and there are indications of a dose-response relationship. However, the studies do not provide sufficient data to determine a specific dose-response curve or to be used as the basis for a risk analysis.* Hence, council considers the risk assessment to be inappropriate.

Council acknowledges the difficulty of using health effects studies to arrive at a specific number to be used as the Time Weighted Average Exposure Limit (TWAEL).

ACOHOS RECOMMENDATION 84-1

that, in cases such as benzene, where there is insufficient or inadequate scientific/medical data on the health effects and/or the dose-response relationship, the minister acknowledge the uncertainty, and propose, for discussion, a range of exposure limits derived from the best evidence available, ensuring that if a risk analysis is to be carried out, the studies used are consistent with the body of the literature.

Council suggests that, in such cases, if a threshold dose for health effects cannot be determined from these studies and from experiences with the agent, the exposure should be reduced to the lowest level possible under the circumstances.

b) *Economic Impact*

At the May 29 meeting of the task force members and ministry officials, it became obvious that the ministry had collected a great deal more information on economic impact than was indicated in 'The Report to the Advisory Council on the Designation of Benzene in Ontario.' (See Appendix II)

It is understood that some of this information is confidential and, hence, unavailable for review. Council suggests that, in future, the ministry should make available to council or provide council with: a list of the

* Many critiques by well-qualified epidemiologists were submitted to the ministry. The task force reviewed 'An Analysis of Health Effects of Benzene and Recommendation for an Occupational Standard', the background literature and the critiques, and came to the conclusion that the studies of Rinsky *et al* and Ott, which formed the basis of the risk assessment, did not contain good enough exposure data to perform a quantitative risk analysis.

information sought, a description of the process used to obtain the economic data, and the extent and nature of the information received.

ACOHOS RECOMMENDATION 84-2

that, if the ministry uses confidential data to justify setting or changing a standard, the minister determine some mechanism whereby the data can be reviewed while still allowing confidentiality to be protected.

2. **Process**

Council noted that an analysis of the economic impact and technical feasibility data led to two substantive changes in the regulation. However, the economic impact and technical feasibility data were not actively solicited until after both the public meeting and the publication of the second draft of the regulation.

This process causes council major concerns, e.g.

1) that substantive changes were made to the regulation after the opportunity for public debate, and without prior warning that these changes were contemplated,
2) that not all interested parties were informed that further information gathering was underway, and
3) that the data used to make the changes were not available for public scrutiny, review or validation.

The extent of these concerns is increased when the nature of the changes is considered, e.g.

1) the TWA Exposure Limit was increased by a factor of five;
2) according to the ministry's own risk assessment, this increases the risk to workers exposed to the maximum level for benzene to twice that calculated for workers exposed to the maximum exposure level for vinyl chloride and asbestos;
3) the exemption of a large proportion of workplaces and workers exposed to benzene (i.e. gasoline stations).

The affected parties were not informed of the changes let alone provided with the opportunity to comment, review the pertinent information or participate in the discussions that led to the decisions. This procedure detracts from the open consultative process that was used to obtain information and allow discussion of the health effects data.

In the meeting with the ministry officials it became clear that, in their view, one of the purposes of the draft regulation is to stimulate public debate. Council notes that this purpose is not stated and does not appear to be consistent with public perception, but does explain the process that led to the late changes noted above. Council was pleased to hear that the ministry is presently consulting with interested parties prior to the publication of a draft regulation for ethylene oxide. Such prior consultations should allow the ministry to publish a draft regulation that is as close to the final form as possible. In this case, the comments on the draft regulation will be more relevant and will contain more

useful information, and the process should be fairer to all parties likely to be affected by the regulation. Also, the purpose of the public meeting will be clearer, and interested parties will know whether or not to attend and will have the chance to prepare appropriate comments and questions for the discussion.

ACOHOS RECOMMENDATION 84-3

that the minister ensure that the initial draft come as close as possible to the final regulation and that the draft is not used primarily to focus public debate.

ACOHOS RECOMMENDATION 84-4

that the minister ensure that the economic and technical feasibility data are obtained and analysed at an early stage in the preparation of a draft regulation.

ACOHOS RECOMMENDATION 84-5

that, if substantive changes are to be made at a late stage, the minister ensure that all interested parties be given an opportunity to comment.

Council also suggests that the initial comment period be specified as 60 or 90 days with no extensions and be consistent for all designated sustances. As parties who are primarily affected by the regulation should have participated in the preliminary discussion, this time period should allow companies and groups adequate time to prepare detailed responses while ensuring no added advantage for late submissions.

3. **Application**

As the format of the regulation is relatively standard for all designated substances, some of the legal-technical issues that caused concern in the past still apply to the benzene regulation, and the concerns outlined below also apply to past regulations.

It is unclear to council what protection the regulation provides to workers in plants where the employer may decide that the benzene regulation does not apply in his workplace. For example, the employer may or may not know if benzene is present in solvents in use at the workplace and may or may not choose to communicate this to the employees. If the employer determines that benzene is being used in the workplace, he is required to do an assessment. If the level of benzene is below the statutory limit and there is no dispute from the joint health and safety committee that the exposure to benzene is unlikely to affect the health of the workers, there is considerable confusion about what form of control program, if any, is required.

Council is concerned that section 4 can be read to mean that once a TWAEL of one ppm is achieved, no further efforts to reduce the exposure are required. To clarify this issue council suggests section 4 be reworded.

Council believes that the ministry should state its plans for implementing the 'lowest practical' phrase in section 4.

ACOHOS RECOMMENDATION 84-6

that the minister announce, along with the standard, the procedures the ministry intends to follow to ensure that exposure levels that are presently below five ppm will not be allowed to increase, and that there will be periodic reviews of the practices and controls with a view to decreasing the exposure levels, as directionally proposed in the regulation.

ACOHOS RECOMMENDATION 84-7

that, in cases where the regulation applies but where there is no requirement for the formal control program specified in the regulation, the minister ensure that there is a monitoring program to ensure that the exposure levels are maintained 'as low as practical'.

Council intends to discuss some of the issues surrounding the medical surveillance for designated substances in its review of the acrylonitrile regulation and associated codes. Council will also be considering the rationale and content of medical surveillance programs in general at a later date. However, with respect to the Code for Medical Surveillance of Benzene Exposed Workers, council questions the extent of the medical surveillance required. Of particular concern is the requirement that a worker be removed from exposure to benzene when haematological tests indicate red or white cell abnormalities. This criterion is very general and not specific for benzene toxicity.

ACOHOS RECOMMENDATION 84-8

that the minister ensure that if removal criteria are to be required, more specific criteria, such as pancytopoenia, be used.

The rationale for exempting workplaces from the regulation appears to be based on:

1) consistently low exposure levels,
2) the cost and administrative difficulty of implementing a control program, and
3) the difficulty of enforcing the requirements of the regulation.

Council considers 1) and 2) are incongruent, i.e. if exposures are consistently low then a control program would not be required, and that 3) is inconsistent with the asbestos regulation. If this is the rationale for exemption, council questions whether there are other employers (not gasoline station owners) who are in a similar situation and who should qualify for exemption.

ACOHOS RECOMMENDATION 84-9

that the minister have a consistent, clearly enunciated rationale for exempting workplaces from regulations.

It is suggested that the ministry monitor exposures and keep abreast of major changes that would alter the use of benzene and, hence, exposures. If major changes occur, the ministry should inform workers and employees and also reconsider the decision to exempt these workplaces.

It has been noted previously, and discussed with ministry officials at the May 29 meeting, that council considers it unnecessary and often impractical to specify in section 15.1 that the exposure records must be kept with the medical records by the physicians. Council acknowledges that the exposure records should be kept for the same length of time and be immediately available for linkage to the medical records.

In conclusion, council would like to stress the essential issues that emerged from the review of the standard setting process leading to the development of the benzene regulation:

- Decision rules should be developed and clearly stated, and explained to all affected parties.
- Decisions should be based on these rules and should be consistent for all designated substance regulations. If they are not, the reasons should be clearly communicated to the parties affected.
- Information should be collected from all interested parties early in the process of developing the regulation and should be used to determine the nature of the draft regulation.
- Substantive changes made late in the process and not communicated to affected parties detract from the open and consultative nature of the development process and should be avoided.

The specific issues that arose from the review were discussed with ministry officials at the May 29 meeting and are summarized in Appendices I and II.

APPENDIX I

Agenda for Discussion With Ministry Officials at the May 29, 1984 Meeting

It should be noted that these questions are posed as agenda items for discussion and may, in some parts, be answered within 'The Report to the Advisory Committee on the Designation of Benzene in Ontario'; however, they are restated to provide a basis for further questions, inquiries or points of clarification.

I. Adequacy and Review of the Background Documentation

a) *Health Effects*

It is acknowledged that there are numerous studies on the health effects of benzene. The source of this information is international and is composed of three types: human experiences (epidemiological studies), animal experiments, and *in vitro* studies.

1) Was the most recent National Toxicology Program data taken into account?
   - Did the finding that benzene is a multipotential carcinogen in animals impact on the decision to:
     - propose the TWAEL limit of one ppm?
     - change the limit to five ppm?
2) Were the *in vitro* studies of Snyder *et al* considered?
   - If so, how did they influence the decisions of numerical values for a TWAEL?
3) Was the estimate of risk (in the Analysis of Health Effects of Benzene, Recommendations for an Occupational Standard) reassessed in view of the numerous critiques submitted?
   - If so, how did this reassessment influence the decisions of the numerical values for a TWAEL?

b) *Economic Impact*

It is clear that background documentation for the economic impact must be collected in Ontario and that it is difficult to perform an analysis until a limit is proposed. With this in mind, the following questions are posed:

1) Is the information contained in Appendix H 'Economic Impact' all the economic impact information that was available to the ministry? When was it compiled?
2) What method was used to obtain this information?
3) Was there any attempt to use an external consultant to help obtain the information?
4) Did ministry personnel or external consultants attempt to validate the estimates received from industry?
5) Was the information received adequate to perform an adequate economic impact analysis?
6) How was the analysis performed?

II. **Process**

1) Did the initially specified 30-day period for comment adversely affect the quality and content of the responses to the July draft of the regulation?
2) Did the period (between July and October drafts and the public meeting) allow adequate time for detailed consideration of the briefs and the revisions which were proposed?
3) Economic impact is noted among the factors to be considered when the decision to designate is made. At what stage(s) in the process is the economic data:
   a) collected?
   b) considered?
   - Was the economic impact considered when the one ppm limit was initially proposed?
4) Did the October draft and public meeting adequately represent the revisions that were under consideration and that were subsequently made after the opportunity for public debate?
5) Has consideration been given to other, or supplementary, means of conveying to the public any substantive changes that are under consideration?
6) What was the rationale for setting the TWAEL at one ppm and maximum exposure limit (MEL) at five?
   - Was it based on health effects data?
   - If so, which studies?
7) What was the rationale for changing the TWAEL from one ppm to five ppm and the MEL from five to 15?
   - Was it based solely on the economic impact?
   - Did it include technical feasibility?
   - Or was it based in part on a reassessment of the health effects data and the risk assessment?
8) It is noted that all the ministry's supporting documentation indicates that exposures at gasoline stations are well below a TWA of one ppm. What was the rationale for excluding gasoline stations?
   - Was it solely on the economic impact of attaining a TWA exposure level of one ppm?
   - If so, was the decision made before or after the change to five ppm?
   - Was it the difficulty of implementing a control program?
   - If so, was consideration given to exempting other industries or workplaces with low exposures?

III. **Application**

An employer is required to do an assessment of the workplace to determine whether a worker's health may be affected by exposure to benzene.

Does that mean that a control program is not required in a workplace if the employer determines that a worker's health is unlikely to be affected and there is no dispute from the joint health and safety committee?

If employers believe that the exposure limits are set on health effects data, then an employer has no reason to suspect worker's health will be

affected if the exposure is below the TWAEL specified. In this case, the TWAEL becomes a minimum exposure level under which a control program is not required.

Is this the reason for the phrase 'the lowest practical level with a view to achieving at least one ppm' and does this make one ppm the minimum or action level?

Would the 'lowest practical level' be legally enforceable and does the ministry feel that enforcement will achieve the stated goal?

Does an exclusion from the designated substances regulation mean that an employer (e.g. a gasoline service station) is not required to monitor benzene exposure or to keep exposures within any limits?

APPENDIX II

Summary of the Responses to Questions Raised at the May 29, 1984 Meeting With Ministry Officials

Question I(a) – Health Effects

Ministry officials responded that the most recent National Toxicology Program Study was not taken into account as it was still in draft form. However, studies by Maltoni *et al* also showing that benzene is a a multipotential carcinogen in animals were considered. Numerous studies on the toxic and carcinogenic properties of benzene were considered, including the studies of Snyder *et al*, but were weighed to account for the difficulties of extrapolating the results to determine potential health effects in humans. There were only two epidemiological studies in humans that documented a sufficient number of cases and contained estimations of the exposure values in a manner that could be used for a risk analysis. The limitations of this approach and the analysis itself were acknowledged; however, the risk analysis was considered appropriate for the type of data that were available, and a reassessment of the analysis considered the new data and the numerous critiques that were submitted. The conclusion from this reassessment was to still support the original recommendation of a TWAEL of one ppm.

Question I(b) – Economic Impact

1) Ministry officials responded that the ministry had considerably more information than that presented to council in its report. They explained that a lot of the information was provided only on the condition that it would be treated as business confidential.

   Although some information was available to the ministry at the beginning of the process of the development of the regulation, it was not actively solicited until just before and after the public meeting in October 1983.

2) It was explained that many approaches were used to obtain the information. Initially, the information was collected passively from the call for submissions and public comment. However, from September to December the information was actively solicited by requesting submissions and briefs, and at numerous meetings and plant visitations. The latter included: in-depth discussions with management about the potential impact of the regulation, the nature of the engineering controls, the number of workers involved and the level of exposures; and, a meeting with a joint health and safety committee about the concerns workers have with the proposed regulation. The data were collected from the benzene producers, petrochemical plants, styrene and rubber producers, steel companies and refineries, i.e. all the major producers and users of benzene in the province.

3) The ministry officials explained that industry is reluctant to provide detailed information to consultants on worker exposure, processes

and engineering controls that the ministry requires. This belief was supported by the experience of receiving this detailed information only on the condition that it was treated as business confidential.

4) Since much of the information was confidential, external validation was out of the question; however, the costs of specific control methods were compared between companies and, in the case of vapour recovery systems for gasoline pumps, the estimates were compared to the U.S. estimates. One estimate that appeared unreasonable was rejected.

5 & 6) Ministry officials responded that the economic analysis that was performed considered only the capital and operating costs of engineering controls that would be needed to reduce the exposure levels of benzene to below one ppm for each of the major producers and users of benzene in Ontario. It was acknowledged that there are many other factors that should be taken into consideration for a complete in-depth economic impact analysis. Now that there are economists on staff in the program development branch, such an analysis could be performed if deemed necessary.

The issue of potential 'spin-offs' from upgraded technology was discussed and it was concluded that for benzene the control technology would not offer companies any significant advantages like increased productivity or decreased waste.

It appeared to the ministry that companies were able and willing to absorb the costs of the control programs required to meet the exposure limits proposed in the final draft of the benzene regulation. With respect to the threshold level for economic impact and technical feasibility, it appeared to vary from one company to another and the highest estimates being three to five ppm TWA.

Question II – Process

1) As the public comment period does not cease until the regulation is filed, the ministry officials did not consider that the initially specified 30-day period with the 18-day extension would have adversely affected the quality or content of the submissions. In response to the ensuing discussion it was acknowledged that the comment period could be longer, but it would be difficult for the ministry to refuse to review late submissions. It was also noted that shortening the comment period without an explanation could be interpreted to mean that the regulation of the substance was more urgent than previous designated substances.

2 & 4) It became obvious from the discussion with ministry officials that the first draft of the regulation proposed exposure levels based on health effects in order to stimulate public debate and was used as a call for information regarding the economic and technical feasibility of the standards.

The public meeting was used to explain the reasons why various

sections were included, excluded or changed; to describe the concerns; the ministry's response to the concerns; and the areas that are still under review, for which the ministry is still seeking information. The information that was sought at the public meeting for benzene included the impact of a TWAEL of one ppm on various industries, the engineering controls required to meet the levels, the existing exposure levels, the number of workers exposed to various levels and the peak exposures experienced by workers.

According to this process, the detailed consideration of the briefs and the analysis of the data would occur after the public meeting. Task force members asked whether interested parties understood that this was the purpose of the draft regulation and public meeting. It was acknowledged that the public appears to perceive the first draft of the regulation as very difficult, if not impossible, to change.

3) An understanding of the process described above and the response to Question I(b) 1) made it clear that the economic impact data were not actively solicited or analysed until just before and after the public meeting. Ministry officials described the present attempts to obtain the information earlier by meeting with affected parties prior to the publication of a draft regulation.

5) Ministry officials responded that consideration has been given to allowing a 30-day comment period before the final regulation is filed. This was contained in a bill that was before cabinet twice, but that has not been passed. However, concern was expressed that this process could cause delays if each dissatisfied party demands a meeting. The ministry officials consider that the final review by council should serve the purpose of exposing any inadequacies or injustices.

Consideration is being given to circulating a transcript of the presentations made at the public meeting to interested parties not present at the meeting.

Task force members noted that if economic impact and technical feasibility data were collected early in the process of developing the regulation, the phenomenon of substantive changes occurring late in the process could be avoided.

6 & 7) Ministry officials had already explained that exposure limits in the initial draft regulation were set considering 'An Analysis of Health Effects of Benzene and Recommendations for an Occupational Standard'. The change in exposure limits was based on economic impact and technical feasibility data, but other factors were also considered before making the decision, i.e.,

1) other jurisdictions have higher exposure limits;
2) different interpretations of the health effects data;
3) the inclusion in section 4 of 'that the exposure be reduced to the lowest practical level with a view to achieving at least one ppm', which indicates that the ministry is aiming at reducing exposures to below one ppm;

4) the uncertainties associated with the risk assessment;
5) the safety of workers required to wear bulky respirators while climbing ladders, walking catwalks, etc. where there are low levels of benzene.

8) According to the response by ministry officials, many factors were considered in making the decision to exempt gasoline stations from the regulation, including:

1) the exclusion of gasoline stations from benzene regulation by OSHA in the U.S.;
2) the exposure levels are well below one ppm;
3) the high turnover of workers, which would make medical surveillance programs costly and difficult to implement for little, if any, benefit;
4) vapour recovery systems, if installed, would be costly, of little benefit, and possibly pose a hazard in Canada's inclement weather;
5) the administrative problems for the ministry of requiring a large number of workplaces to do something they are unlikely to do, i.e. maintain joint health and safety committees and conduct periodic assessments.

The issue of excluding other workplaces was discussed and it appeared that no other industry that applied for exemption had consistently low exposure levels to benzene and had administrative difficulties being included in the regulation.

Question III – Application

The ministry officials explained that, if the regulation applies, the employer is required to perform an assessment. If the exposures are below the statutory limit and if the employer decides that the health of a worker is unlikely to be affected by exposure to benzene and there is no dispute from the joint health and safety committee, no control program is required. They went on to stress that the ministry does not receive the assessment or approve the control program. The only way that the ministry is involved in the decision is if there is a dispute or if a party requests guidance. During routine inspections an inspector will determine if a designated substance is used at the workplace and the number of workers exposed, and will check the minutes of the joint health and safety committee.

It was explained the 'lowest practical level' is necessary when medical personnel cannot agree with any certainty that there is a level below which there will be no adverse health effects. The purpose is to induce employers to reduce exposure levels, and not to let the levels creep up to the exposure limit. The purpose is not to prosecute; however, this may sometimes be necessary, and employers who allow levels to creep up would be subject to prosecution.

Ministry officials continued by explaining that the lowest practical level is specific to a time and place and should be determined by the employer working with the joint health and safety committee for each workplace, and, in the case of a dispute, the ministry can be consulted. A guidance note has been issued to the inspectorate and labour and management representa-

tives to indicate the ministry's meaning and the factors that need to be considered.

In response to the last question, it was explained that an exemption means that monitoring exposure levels are not required; however, the employer is under the general obligation of the Act, e.g. 14 2(g) 'to take every precaution reasonable in the circumstances for the protection of a worker.' A gasoline station operator also has to comply with the provisions of the Regulations for Industrial Establishments. Section 145 provides that, where a worker is likely to be exposed to a toxic substance, certain precautions have to be taken. Usually the Threshold Level Values (TLVs) of the ACGIH are used as guidelines for exposure limits. However, in cases where the substance is designated, like benzene, the standard in the regulation will be used as the exposure limit. Hence, there is provision for protecting workers exposed to a designated substance even when they are exempt from the specific designated substance regulation.

Ontario

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Ministry of Labour

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October 25, 1984

Dr. D. R. McCalla
Chairman,
Advisory Council on Occupational
Health and Occupational Safety
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Dear Dr. McCalla:

Thank you for your letter of July 26, 1984 forwarding a copy of Advisory Memorandum 84-I, containing Council's advice on the process for the development of the benzene regulation.

I appreciate that many of the issues addressed and recommendations contained in this memorandum transcend the regulation of benzene and are relevant to the designation process in general.

I look forward to receiving Council's advice once it has considered its Task Force report on the issues of the criteria for designation and alternative strategies for controlling harmful agents. Nonetheless, several of the recommendations contained in the benzene advice have a direct bearing on substances which are being considered for designation at the present time.

I have noted Council's opposition to the use of quantitative risk assessments in the development of the benzene regulation. I am told that officials explained at the public meeting held in October, 1983 and in meetings with representatives of industry and with your Task Force, the Ministry's position on the use of quantitative risk assessment in deriving a recommended exposure limit for benzene. Council has advised that quantitative risk assessment can play an important role along with bio-assay test results, animal studies, and epidemiological studies, in assessing the health hazards of exposure to a substance. My experts tell me that the data provided in the studies used for the benzene risk assessment are better than for most historical prospective occupational mortality studies, excluding asbestos and probably arsenic. My officials noted in the Report on the Designation of Benzene, transmitted to the Council on March 13, 1984, that the recommendation for an exposure limit was based not only on the risk assessment, but also on other reports and findings including animal studies and in vitro studies.

Ministry officials recognize that the approach used in the case of benzene cannot always be used. In developing the regulation for coke oven emissions and acrylonitrile, my officials did not perform a quantitative risk assessment during the health effects review since the data available were judged to be inadequate.

In February, 1983, I received from the Advisory Council Memorandum 82-V setting out Council's views on the Principles and Procedures for the Interpretation of Epidemiology Studies. The principles contained in this memorandum served as a guideline for Drs. Harry Shannon and Steven Walter, Associate Professors at the Department of Clinical Epidemiology and Bio-Statistics at McMaster University who conducted for the Ministry a critique of the literature pertaining to human health risks of exposure to benzene. Drs. Shannon and Walter have confirmed that the most suitable studies upon which to base a quantitative risk assessment were those by Rinsky, Monson and the 1980 study by Ott. In other words, before initiating the quantitative risk assessment, Ministry officials obtained an independent review of whether the quality of evidence warranted proceeding with a quantitative risk assessment.

Council's first recommendation suggests, where there is insufficient or inadequate scientific/medical data on health effects and/or a dose-response relationship, that the Minister acknowledge the uncertainty and propose for discussion a range of exposure limits derived from the best available evidence. Council also suggests that if the risk analysis is to be carried out, the Ministry should ensure that studies used are consistent with the body of literature. With regard to the latter suggestion, Ministry officials believe that the approach to the analysis of health effects literature on benzene is consistent with approaches taken in other jurisdictions and further, that they have been sensitive to the strengths and weaknesses of the available evidence. Indeed, I am told that the uncertainty of the data was referred to both in the health effects document and at subsequent meetings.

The suggestion that the Ministry propose for discussion a range of exposure limits derived from the best available evidence goes to the heart of the process for developing a designated substance regulation. As you are aware, the current procedure is that the health effects document is made available to interested parties at the same time as a proposed regulation is published in The Ontario Gazette. Following the publication of the proposed regulation, which contains an exposure limit, the parties may comment on the appropriateness of that exposure value and the quality of evidence used to derive it. They may also make submissions as to the economic impact of meeting the exposure value.

It appears that Council believes that, even prior to the publication of a proposed regulation, there should be an opportunity for the parties to review a range of exposure values derived from the best available health effects evidence. My officials advise me that such a course of action is certainly open for discussion. A number of issues must be considered, including whether such discussion would indeed result in greater acceptance of the value selected without immobilizing

the process of regulation development. The suggestion has considerable merit in light of Council's further recommendations addressed below concerning the process of developing designated substance regulations.

Council has commented on the economic impact information collected by the Ministry. Council has suggested that when confidential information is collected, the Ministry should make available a list of the information sought, a description of the process used to obtain the economic data and the extent and nature of the information received. My officials advise me that in future, they will endeavour to provide such information to Council in such a manner as to respect legitimate confidential information in accordance with the guidance which may be provided by Ministry legal counsel.

Council made three recommendations which touch upon the process for developing designated substance regulations. Council notes its belief that the analysis of economic impact and technical feasibility data led to substantive changes in the regulation being made after the public meeting and the publication of the second draft of the regulation, and that the parties were not given fair notice that such changes might be made. After reviewing Council's tapes of the proceedings, my officials have assured me that those parties in attendance at the public meeting were expressly advised that further changes to the regulation were possible. As Council has been informed, interested parties were told that the actual public comment period does not cease until the regulation is presented to Cabinet and is filed with the Registrar of Regulations. A notice to this effect appeared in 13 daily newspapers across Ontario. This policy was reconfirmed by my Deputy Minister in his opening remarks at the October 11, 1983 public meeting. He stressed that any changes made were proposals only and that the Ministry was requesting further comments.

At the public meeting, other Ministry officials and staff shared with the interested parties concerns raised in submissions and the Ministry's proposed response to these concerns. The Ministry expressly requested further information on some issues, notably the proposed exemption of gasoline stations, the exposure limits, and the types of engineering controls that may be required and the costs. Slides shown at the meeting during the presentation clearly indicated that these matters were under review. The Ministry requested additional information on the impact of a 1 ppm time-weighted average exposure limit on various industries, the existing exposure levels in industry, particularly the nature of peak benzene exposures routinely experienced by workers, and the number of workers exposed to various levels of benzene.

Ministry officials pointed out that the regulation might be further revised as a result of comments or submissions made at or after the meeting and as a result of advice received from the Advisory Council on Occupational Health and Occupational Safety. They again stressed that the actual comment period does not cease until the regulation is presented to Cabinet and filed with the Registrar of Regulations.

After the public meeting, Ministry officials held meetings with interested persons when requested or when it was believed a useful exchange of information would result. Ministry officials held discussions with representatives of companies that produce and use benzene, including all of the benzene producers, the major gasoline and solvent producers, and the steel companies.

My officials have considered Council's concern about decisions made on the basis of information received subsequent to the public meeting and agree that the rationale for the decisions should be shared with the parties. To meet this concern, a summary of the factual information which caused the Ministry to propose altering the exposure values and exempting the gasoline stations will be prepared and distributed to interested parties.

There is considerable merit to Council's recommendations 84-3 and 84-4 in which Council recommends that the proposed regulation come as close as possible to the final regulation and that economic and technical feasibility data be obtained and analyzed at an early stage in the preparation of a proposed regulation. As I noted above, the issue is how to accomplish these objectives without immobilizing the decision making process. The fact is that the present process recognizes that the Ministry is not in possession at the outset of all the information it needs to proceed with a final designated substance regulation. The draft regulation contains an exposure value, generally based on health effects information. This value is included to promote the receipt of further information, scientific, technical and economic which the Ministry takes into account in determining whether or not the draft regulation in general, and the exposure value in particular, should be revised. Viewed from this perspective then, I hope it is clear why the final regulation, including the exposure value, may depart from the draft.

My officials and I are in sympathy with the principle of increased participation in regulation development by both industry and organized labour. The Advisory Council, in its memorandum 79-II, has underlined the importance of the Ministry establishing and involving multi-partite advisory committees in the regulation development process.

The role of these committees must be made clear. There are two basic components to the development of regulations. The first is a collection and evaluation of information necessary to make decisions respecting worker protection. The other aspect is the decision itself, which certainly must be made by the government.

The Ministry recognizes that many workers, professionals, and others in the private sector have a wealth of knowledge gained through their experience which is invaluable in developing informed legislation. Section 11 of the Occupational Health and Safety Act provides not only for the appointment of advisory committees to assist the Minister on matters arising under the Act, but also for remuneration and expenses for persons serving on these committees. I therefore propose that, whenever appropriate, multi-partite advisory committees be established to work with government officials in developing

designated substance regulations within the present regulation development system beginning with the publication of notices in The Ontario Gazette. Such committees would be advisory in nature, would have agreed upon terms of reference, but focus on ensuring that the Ministry has collected the appropriate information, and would assist in the review and analysis of the information.

As this approach would introduce a further element to the existing open and consultative process, any such development would have to be carefully monitored to ensure that the regulation-making process does not become immobilized by disagreement. If this is the case, the Ministry would have to reconsider the use of these committees.

The establishment of multi-partite advisory committees could overcome some of the concerns expressed by Council and I look forward to receiving your comments on this proposal at your earliest convenience.

If the above process is implemented, it hopefully will reduce the number of cases in which draft regulations are altered following the public meeting. If the Ministry does make changes to a regulation at a later stage in the process, my officials will ensure that all interested parties are advised of the change and the reasons therefor.

Council has also suggested that the initial comment period following the publication of the proposed regulation be specified as 60 or 90 days with no extensions, and be consistent for all designated substance regulations. I concur with Council's assessment that, as long as the parties who are primarily affected by the regulation have participated in preliminary discussions, a 90-day comment period following the publication of a proposed regulation should be appropriate for the parties to submit briefs. However, my officials and I believe that if there are parties who have not participated in these early discussions who cannot submit briefs within the 90 day period, it is not unreasonable to accept those submissions and incorporate the information in the decision-making process.

Section 3 of the Advisory Memorandum contains several recommendations concerning the application of the existing designated substance regulations. I would like to address these in turn.

Council states that it is unclear "what protection the regulation provides to workers in plants where the employer may decide that the benzene regulation does not apply in his workplace. For example, the employer may or may not know if benzene is present in solvents in use at the workplace and may or may not choose to communicate this to the employees". It appears that Council has assumed that the employer has the final say in determining whether a regulation applies to his workplace or not. As my officials have advised Council on previous occasions, the Ministry has an active program to alert employers and workers to the existence of designated substance regulations and their application to particular workplaces. Indeed, members of joint health and safety committees, or workers themselves, may and do bring complaints before the Ministry regarding the manner in

which the employer has dealt with a particular designated substance regulation. Ministry officials investigate such complaints without delay and make a decision which is shared with the parties. Should Ministry officials find assessments or control programs to be deficient, guidance may be given, orders issued, and prosecutions initiated as appropriate.

As Council members are aware, the report on the Royal Commission on Asbestos contains a recommendation that the Ministry establish a designated substances enforcement unit to audit employers' compliance with the regulations. My officials and I are currently giving this recommendation careful consideration.

Council has suggested that section 4 of the proposed regulation be reworded so that employers may not consider that if benzene exposures are reduced to 1 ppm as a time weighted average that they are under no obligation to reduce exposures further. Section 4 of the benzene regulation states that employers must reduce exposures "to the lowest practical level with a view to achieving at least 1 ppm". I am advised that the inclusion of the phrase "at least" means that the lowest practical level might well be below 1 ppm in a particular plant. As Council has been advised in relation to previous regulations, the phrase has been included not only to oblige employers to reduce exposures to less than 1 ppm if this is practical, but to ensure that those employers who have succeeded in doing this do not slip up to the 1 ppm level.

Council states that the Ministry "should state its plans for implementing the lowest practical phrase in section 4". This phrase has been used in other designated substance regulations which are now law. The Ministry has prepared and shared with Council and interested parties its interpretation of the phrase. I have attached a copy for your information. That same interpretation is used by Ministry professionals and the inspectorate in administering and enforcing the regulations during inspections and upon investigations.

Council recommends in recommendation 84-6 that the Ministry adopt procedures "to ensure that (benzene) exposure levels that are presently below 5 ppm will not be allowed to increase". As I have noted above, the lowest practical level interpretation is currently administered to meet such an objective. Should a designated substances enforcement unit be established, it could be charged with the responsibility of reviewing the adequacy of assessment and control programs in workplaces where one or more designated substance regulations apply.

In recommendation 84-7 Council recommends that the Ministry ensure that there are air monitoring programs to ensure that exposure levels are maintained as low as practical even where there is no requirement for a control program. My officials advise that if the regulation applies at a workplace then a control program, including provisions for air monitoring, is required if the health of the worker is likely to be affected. If this condition is not present then the law does not require that a control program or air monitoring program be put in place. Clearly, in this case, exposure levels would be below any level which is likely to harm the health of the worker, whether or not it is

actually the lowest practical level. The proposed regulation does require that, should the conditions of work change, then another assessment is required. Until a properly conducted assessment indicates that a worker's health is likely to be affected, no control program or air monitoring program can be required. As Council is aware, the regulatory scheme, through the compulsory involvement of mandatory joint health and safety committees, and the provision for an inspector to make a decision where there is a dispute between the employer and the committee, contains procedures to ensure that workers receive appropriate protection under the Act and regulations.

Council appears to be suggesting that a further law be passed which would require air monitoring in all workplaces, even where there is no evidence that health is likely to be harmed. I understand that Council's Task Force on Criteria and Alternative Approaches for the Control of Hazardous Substances and Agents in the Workplace will consider alternative approaches including possible modifications of the current model of designated substance regulations. The issue of the nature and extent of mandatory air monitoring for toxic substances including designated substances would appear to be a matter for the consideration of this task force.

I note that Council will be considering the rationale and content of medical surveillance programs in general at a later date. I look forward to receiving Council's advice on this very important and complex subject.

However, Council did question the extent of medical surveillance required by the Code for Medical Surveillance for benzene exposed workers and the advice regarding worker removal from exposure. My officials have reviewed Part 4 (clinical tests) of the Code for Medical Surveillance. They have revised it to avoid any misunderstanding that a worker with confirmed blood cell abnormalities should be removed from work prior to receiving the results of a further detailed medical/clinical investigation. As a result of this investigation the examining physician will consider, in consultation with the worker, the most appropriate course of action. I am advised that it is not possible to specify any specific blood abnormalities that would require removal from benzene exposure. This decision must be left to the professional judgement of the examining physician taking into account the particular circumstances of the worker.

Council states that its understanding of the Ministry's rationale for exempting workplaces from the regulation is that it appears to be based on:

1. consistently low exposure levels;

2. the cost and administrative difficulty of implementing a control program; and

3. the difficulty of enforcing the requirements of the regulation.

My officials believe that, in the case of benzene, this is an over-simplification of the considerations which led to an exemption of gasoline stations from the proposed regulation. As my officials explained at the May 29th meeting, the exemption for gasoline stations was initially requested by oil companies following the publication of the proposed regulation in July 1983. At the open review meeting, the Ministry advised the parties that it was considering the appropriateness of such an exemption and requested further information on exposure levels, types of engineering controls that may be required and their costs.

After the public meeting, my officials considered the information provided following the meeting and other information collected. As noted in the Report to the Advisory Council on the Designation of Benzene in Ontario, my officials noted:

- that based on recent U.S. and Canadian studies as well as a Ministry of Labour survey, worker exposure to benzene in gasoline stations is minimal;

- that the only method for reducing benzene levels further in gasoline is by the installation of vapour recovery systems. These systems have been in use in California and Washington, D.C. and Ministry officials have been advised that when such recovery nozzles fail they may present a greater risk of benzene exposure. In addition, the vapour recovery systems have not been tested in Ontario and might have to be modified for use under the more severe climatic conditions prevailing in Ontario;

- that the best estimate of capital costs for the installation of vapour recovery systems in gasoline stations is $150 million. Additional annual operating costs are estimated to be $13.3 million;

- that employee turnover in many gasoline stations is high resulting in a high cost and inconvenience for employers and workers to participate in the medical surveillance program; and

- that there would be considerable administrative implications for employers, workers and the Ministry to ensure that all the requirements of a designated substance regulation were in place.

In other words, my officials advised Council that in light of the minimal exposures, untried control technology, potential high costs and considerable administrative implications, an exemption for gasoline stations was proposed. As you will observe, a decision to make any exemption from a regulation is a difficult and often controversial one, and as a result is made only after very careful consideration.

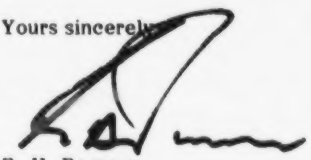
Council asks whether there are other employers who should qualify for exemption from the proposed benzene regulation. As was explained at the October public meeting, and again in the report to Council on the designation of benzene, my officials also considered a possible exemption for products containing less than a certain percentage of benzene in response to a request in this regard. Such an

exemption would have resulted in the regulation not applying to many workplaces where the only source of benzene exposure is its release from hydrocarbon solvents. My officials advise that this approach was rejected as a result of research which indicates that, while the release of such solvents would usually involve a very low exposure to benzene, this would not always be the case.

Council has also suggested that, where workplaces have been exempted from a regulation, the Ministry should continue to monitor exposures and keep abreast of major changes that would alter the use of benzene and hence worker exposure. In the case of benzene, my officials advise that they plan to continue to monitor worker exposures to benzene at gasoline stations. I have asked them to advise me if there is a major shift in exposure patterns, or if other information comes to their attention which suggests that such an exemption is no longer appropriate.

Once again, I would like to thank Council for its considered advice on the regulation of exposures to benzene, one of the most difficult and complex area of public policy.

Yours sincerely,



R. H. Ramsay
Minister

APPENDIX

The Interpretation to be Placed on the Phrase

"The Lowest Practical Level"

A number of the designated substance regulations that have been promulgated by the Ministry of Labour require employers to reduce exposure to particular substances to the "lowest practical level". The purpose of this note is to provide guidance to employers and to members of joint health and safety committees on how one identifies the lowest practical exposure level that should be achieved in a given workplace.

In order to address this issue, it will be necessary to review the provisions contained in these regulations that relate to the maintenance of exposure levels. The isocyanates regulation (hereinafter referred to as the regulation) will be employed as the example.

The key provision of the regulation is subsection 4(1) which states that:

> "Every employer shall take all necessary measures and procedures by means of engineering controls, work practices and hygiene practices and facilities to ensure that the time-weighted average exposure of a worker to isocyanates is reduced to the lowest practical level and in any case shall not exceed 0.005 parts isocyanates per million parts air....."

Subsection 4(3) elaborates on the methods that may be employed to achieve the exposure levels. This provision specifies that "subject to subsection (7) every employer shall comply with (subsection 1) ...without requiring a worker to wear or use respiratory equipment". Subsection 7, in turn, provides that:

> "Where the strict duty imposed by subsection 1 ... cannot be complied with because,
>
> a) an emergency exists; or
>
> b) the measures and procedures necessary to control the exposure of a worker to the airborne isocyanates,
>
> i) do not exist or are not available.
>
> ii) are not reasonable or practical for the length of time or frequency of exposure or the nature of the process, operation or work, or
>
> iii) are not effective because of a temporary breakdown of equipment,
>
> the employer shall provide a worker with respiratory equipment which shall be used by the worker."

Where subsection 4(1) must be complied with, it will fall to the employer, in consultation with the joint health and safety committee, to determine the lowest practical exposure level that can be achieved in a particular location. This is of course subject to audit by the Ministry inspectorate. What does the term "lowest practical level" actually mean? In the Ministry's view, this term, when read in the context of subsection 4(1), means that an employer would be required to adopt those engineering controls, work practices and hygiene practices that a responsible and prudent employer would put into effect taking into consideration the plant, equipment, engineering controls and work practices in the workplace, and what can be done by way of improvement, modification and replacement, where this is realistic and reasonable for the particular workplace.

The question of whether an employer has, through the use of engineering controls and related measures, reduced exposures to the lowest practical level, is difficult to answer in the abstract. What levels are reasonably capable of being achieved will invariably depend on the characteristics of individual work sites, no two of which are exactly alike. In this respect, the measures and procedures adopted in one location may not be practical for another. Therefore, the lowest practical level must be determined for a specific workplace at a given point in time.

There are, however, a number of factors that should be considered in determining whether the lowest practical level has been obtained. Some of these factors are:

1) The extent of the health benefits that will likely be obtained from improvements or modifications to existing engineering controls, etc. in the workplace.

2) The exposure levels that were achieved in the work site in the past.

3) The exposure levels being met in similar worksites.

4) The cost of introducing new engineering controls, or modifying those already in place.

5) The technological feasibility of achieving lower exposure levels.

The opinion provided in this document does not have a binding effect, but is intended to respond to questions asked in the context of a specific fact situation. The opinion will be used by staff of the Ministry to assist in the administration of the Act, and may not be applicable where the facts are dissimilar.

It is unnecessary to point out that questions of construction and application will find their ultimate resolution in the courts when a contest ensues as to the construction or application of a legislative provision.

Ontario

Advisory Council on Occupational Health & Occupational Safety

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December 20, 1984

The Honourable R.H. Ramsay
Minister of Labour
400 University Avenue, 14th Floor
TORONTO, Ontario
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Dear Mr. Ramsay:

This letter is in response to your request of October 25, 1984 for council's comments regarding the establishment of multi-partite advisory committees to aid in the development of designated substance regulations. You suggest such committees would focus on ensuring that the ministry has collected the appropriate information and would assist in the review and analysis of the information.

As you have noted, such committees could overcome some of council's concerns regarding the standard-setting process by ensuring early involvement of interested/affected parties.

The Advisory Council wishes to encourage early consultations and considers that multipartite committees would supplement the existing designation process. Council suggests that this approach be used for substances presently being considered for designation and that the experience be evaluated and compared with those of the present process and its recent variations.

As you are aware, council presently has a task force considering criteria and alternative strategies for controlling hazardous substances and agents in the workplace. When the recommendations from this task force have been discussed, council will be in a better position to offer advice on the process of developing control strategies allowing for maximum participation of affected parties.

Yours truly,

D. R. McCalla
Chairman

cc to: T. E. Armstrong, Q.C.
Dr. A. E. Robinson
B. Goodman

Advisory Memorandum 84-II

Ontario

Advisory Council on Occupational Health & Occupational Safety

Office of the Chairman

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August 3, 1984

The Honourable R. H. Ramsay
Minister of Labour
400 University Avenue, 14th Floor
TORONTO, Ontario
M7A 1T7

Dear Mr. Minister,

I am pleased to submit to you Council's Advisory Memorandum 84-II. This paper deals with the difficult questions surrounding the control of reproductive hazards in the workplace. While the initial focus in this area arose out of consideration of matters relating to women and occupational health and safety, the scope of the subject is broad and reproductive risks exist for both males and females.

Council believes that matters pertaining to women should be considered as an integral part of occupational health and safety concerns and treated centrally rather than as a peripheral issue.

Council hopes its advice in this area will be helpful.

Yours truly,

D. R. McCalla
Chairman

Encl.

cc to: T. E. Armstrong, Q.C.
Dr. A. E. Robinson
Mr. B. Goodman

Advisory Memorandum 84-II to the Minister of Labour July 26, 1984

Concerning Reproductive Hazards in the Workplace

INTRODUCTION

The problem of reproductive hazards in the workplace has arisen for consideration in the deliberations of council's Task Force on Women and Occupational Health and Safety; but the sweep of the issues involved is wide. Male and female workers of reproductive capacity, their offspring, and society as a whole are vitally affected by the ways in which these problems and issues are treated.

As evidence reviewed by council indicates, both males and females may be at reproductive risk from workplace hazards. For example,currently there is evidence of sterility associated with exposure of males to dibromochloropropane (DBCP); glycol ethers affect the male gametes and the developing embryo and fetus; and the handling of hormonal chemicals used in the manufacture of birth control pills can affect the fertility of both male and female workers. Minimizing these risks is in the interest of workers and their offspring as well as being in society's interest for the protection of its future generations. Ideally, a policy directed toward minimizing the risk from reproductive hazards in the workplace would seek to protect the most vulnerable link in the reproductive chain: male or female gametes and reproductive systems, embryo, fetus, and nursing child.

In practice, however, scientific knowledge regarding reproductive risks is limited, and the dose-response relationships between exposure to hazardous substances and the effect on gametes, embryo, fetus and child are rarely known with sufficient certainty to establish a 'safe' exposure level. Even where a safety threshold can be determined, and particularly where information is so limited that only zero exposure can be presumed to be safe, the control technology to achieve this standard may entail substantial costs. ('Control technology' is used here and throughout this memorandum in a broad sense embracing workplace hygiene practices as well as engineering controls). Furthermore, determining when reproductive risks are relevant to given workers (e.g. determining when they are likely to conceive, or may be attempting to conceive a child, or are in the early stages of pregnancy) would involve what some may consider to be an invasion of privacy.

Policies for the control of reproductive hazards have tended to centre on the removal of pregnant women or, in some cases, all women of reproductive capacity from workplaces containing reproductive hazards. The first of these options, at least, is an understandable and pragmatic response: the removal of the fetus from the workplace constitutes the most obvious line of defence against reproductive hazards. Furthermore, removal of pregnant women from the workplace, even if it entails reassignment or compensation, may, in many cases, impose, or appear to impose, fewer costs upon employers than would the installation of control technology.

However, the option of removing pregnant women is deficient in a number of respects. It does not protect against reproductive hazards to males nor against hazards to the female reproductive system before or just after conception, that is, before pregnancy is identified. It may leave a woman with fewer financial resources during her pregnancy when her well-being is crucial for the development of her child. Furthermore, the requirement to remove, reassign, and/or compensate a woman once she becomes pregnant may act as a general deterrent to employers from hiring women. This option and, of course, the broad option of excluding women of reproductive capacity from workplaces with reproductive hazards reinforce the more widespread problem of reduced opportunities for female employment.

It may be that these exclusion options are the only options feasible in some cases, and that reduced opportunities for female employment are one set of costs that must be incurred in order to protect the health of future generations. What we wish to argue here, however, is that such a policy should be considered not a first and obvious measure, but a last resort. Removal of pregnant workers, as indeed removal of any set of male or female workers of reproductive capacity, is justifiable only where the costs of less discriminatory options are so great that they outweigh the disadvantages of discrimination.

Furthermore, any such removal policy should be buttressed by measures intended to reduce its negative effects. The costs of measures such as reassignment and/or compensation should not be borne by employers alone, but should be spread across a broader social base. In this context, it may be necessary to consider measures such as an extension of current pregnancy leave provisions.

In general, a policy toward reproductive hazards in the workplace should have two objectives:

a) To protect the most vulnerable link in the reproductive chain: e.g. gamete, embryo, fetus, nursing child.
b) To achieve this protection through the least discriminatory mechanism, that is, the mechanism least likely to reduce employment opportunities for an identifiable group of workers.

Both of these objectives must, of necessity, be pursued within constraints posed by economic and technological feasibility and by existing scientific knowledge regarding the extent of risk.

The latter constraint, in particular, merits fuller discussion. Scientific knowledge regarding reproductive risks from exposure to environmental factors is greatly underdeveloped and relies heavily on limited evidence drawn from biological or animal experiments or from epidemiological research. In the former category, extrapolation must be made either from observed results *in vitro* or from non-human biological systems to humans – extrapolation whose validity is open to question. Furthermore, given the methodological requirements of these experiments, extrapolations must typically be made from high dose to low dose effects. Epidemiological evidence is susceptible to a variety of (sometimes unavoidable) methodological problems as outlined in council's Advisory Memorandum 82-V on Principles and Procedures for the Interpretation of Epidemiological Evidence and its Appendix. Such

evidence is not available regarding new substances, and an *in vitro* or animal screen would be necessary for example, if we wish to prevent the introduction of new hazards before they are identified epidemiologically.

A recognition of such uncertainties suggests the addition of several principles to a general policy toward reproductive risk. First, judgements as to whether a given substance is to be treated as a reproductive hazard ought to be made on the side of caution. Genetic damage carries very large individual and social monetary and non-monetary costs. Second, in choosing an appropriate mode of protection where dose-exposure relationships are not known, it should be recognized that some mechanisms of protection (such as temporary reassignment) are less dependent upon such knowledge than others. This may lead to the anomalous situation in which certain groups of workers may be excluded from exposure to uncertain hazards, but permitted to work with known hazards for which a safe exposure level can be determined.

To reduce these anomalies with their attendant costs to both workers and management while maintaining a cautious and protective approach, continual development of a knowledge base and periodic reassessment of existing modes of protection must be an essential part of an overall policy toward reproductive risk. This is true with respect to all occupational hazards, but it is particularly important in an area as scientifically underdeveloped and as socially significant as reproductive risk.

With this background in mind, a number of options for alternative exposure standards can be set out and discussed in somewhat greater detail. The options are listed in a rough descending order of costs of control technology and, correspondingly, a descending order of protectiveness.

Examples of Alternative Exposure Standards

a) *Single 'Most Protective' Standard*

Pros:
- Avoids reproductive risks to males and females, and risk to offspring;
- avoids discrimination in employment of a perceived vulnerable group (usually women);
- avoids need for removal of male or female workers for family planning or of pregnant women in excess of normal pregnancy leave as well as a variety of associated costs.

Cons:
- Control technology may be more costly than for other options;
- assumes reasonable degree of certainty regarding a 'safe' exposure level.

b) *Multiple Standard: A' Most Protective' Standard for Women of Reproductive Capacity or for Men (depending on whether the hazard threatens the female or the male reproductive system). Another Standard for the Average Worker*

Pros:
- Avoids reproductive risks to males and females, and risk to offspring;
- avoids need for removal of male or female workers for family

planning or of pregnant women in excess of normal pregnancy leave as well as a variety of associated costs;
- control technology may be less costly than for 'most protective' standard.

Cons:
- Assumes reasonable degree of certainty regarding 'safe' exposure level;
- may lead to discrimination in employment of group requiring more protective standard. (In the preponderance of cases, this group is likely to be female).

c) *Multiple Standard: One for the Average Worker, Another, More Protective Standard, for Pregnant Workers*

Pros:
- Control technology may be less costly than in a) and b).

Cons:
- May expose males to reproductive risks;
- harm may occur before pregnancy is identified;
- may lead to discrimination in employment of women (less than in b);
- assumes reasonable degree of certainty regarding 'safe' exposure level.

d) *Average Worker Standard with Provisions to Remove and Reassign Males or Females on Request for Family Planning Purposes*

Pros:
- Control technology may be less than in a), b), or c);
- does not require certainty re 'safe' exposure levels for reproductive systems.

Cons:
- Harm may occur in unanticipated pregnancies;
- may be seen as an invasion of privacy;
- may deter employment of group likely to request removal;
- reassignment may not be possible in small businesses;
- may lead to a variety of associated costs as discussed under e) below.

e) *Average Worker Standard With Requirements or Provisions to Remove Pregnant Worker in Excess of Normal Pregnancy Leave*

Pros:
- Control technology may be less costly than in other options;
- does not assume certainty regarding 'safe' exposure levels for fetus.

Cons:
- May expose males to reproductive risks;
- may expose females to reproductive risks if removal is voluntary;
- harm may occur before pregnancy is identified;
- may lead to discrimination in employment of women;
- may lead to a variety of possible additional costs, e.g.
  - reassignment/rate retention;
  - paid leave or compensation;

- or, where the above are not provided, reduced financial support during pregnancy may, in turn,
  - expose the unborn child and mother to a different kind of risk;
  - create, if removal is mandatory a financial incentive for worker to extend the time before which employer informed of pregnancy.

f) *Average Worker Standard*

Pros:
- Control technology may be less costly than in other options.

Cons:
- Does not reduce reproductive risk to males and females;
- may lead to reduced employment of group at risk (usually women) as employers refuse to incur liability for damage to members of that group or their offspring or as members of that group refuse to accept hazardous work.

No attempt has been made in the above examples to rank or quantify the extent of costs or benefits associated with different options; indeed, it is not possible to generalize as to which option produces the greatest net benefit. However, moving away from a 'most protective' standard towards other options increases both the potential for reproductive harm for men and women and the likelihood of negative effects on the employment of higher-risk or perceived higher-risk groups—often women capable of bearing children.

Establishing Exposure Level Standards

Since a single 'most protective' standard achieves both of the fundamental objectives of a reproductive risk policy – protection and non-discrimination – in council's view there ought to be a presumption in favour of such a standard.

ACOHOS RECOMMENDATION 84-10

> that the Minister of Labour, in establishing standards for substances and agents that are reproductive hazards, follow the principle that there be a presumption in favour of a single 'most protective' standard for all workers, set at a level that protects the most vulnerable link in the reproductive chain.

Further, and fundamental to this presumptive approach, is the assumption that it should be incumbent upon the ministry to demonstrate just cause in any instances of deviation from the position of a single 'most protective' standard. In some circumstances, economic and technical factors may mean that a 'most protective' standard is not feasible or practical. In such cases, the standard setter should demonstrate economic or technological impracticality of such a standard before choosing an alternative measure. It must be recognized that where a single 'most protective' standard is not achieved, alternative approaches may give rise to implications for employment, health risk and/or other costs such as have been identified as 'cons' in

the above discussion of alternative exposure standards. Therefore, determination of economic or technological impracticality cannot be made in isolation from these considerations.

The pros and cons of the various options listed above need to be assessed in the light of the particular circumstances in which specific reproductive risks arise. The factors to be considered include the following:

- the degree of certainty with which risks are known. Where there is considerable uncertainty about the magnitude of risk, provisions for removal of the worker at risk may be preferable to mandated exposure standards or removal;
- the number and age/sex distribution of affected jobs. It must be emphasized, however, that the composition of the labour force may reflect pre-existing social inequities or a rationale that is dated in its validity, and, therefore, exploration of the implications of possible differential treatment or exclusion of women or other sub-groups deemed sensitive, should go beyond concern with those who may be presently employed in affected workplaces;
- social inequities – i.e. whether there are factors associated with the population in question (e.g. relative to income, job security, age, sex, minority status, education, health status) that might affect their ability to mitigate or offset harm;
- the extent to which exclusion or temporary removal from particular jobs or workplaces infringes upon access of excluded workers to other positions in given organizations or fields;
- consideration of the cumulative effect of exclusion or of temporary removal owing to a proliferation of substances or agents that pose health hazards or to ergonomic factors;
- employment and work practices currently used to address differential risk or perceived differential risk.

One important forum for the discussion and assessment of these and related factors in Ontario is provided by the ministry's consultative process for standard setting. Council is concerned, however, that the issues surrounding reproductive hazards have not been as fully aired as they might have been in the processes leading to the development of 'designated substance' regulations to date. In the case of lead and mercury, for example, reproductive issues and elements of two-level standards were introduced into the codes for medical surveillance late in the process. In other cases, such as vinyl chloride and coke oven emissions, reproductive issues received little attention.

To some extent, this neglect may reflect a broader problem in the standard setting process. Even open processes will only incorporate those groups that are sufficiently informed and mobilized to participate. In particular, in the case of standards for substances or agents that tend to be used in workplaces in which women traditionally have been underrepresented or excluded, it could be expected that concerns of women may not be addressed as fully as is desirable.

Council has previously made a number of suggestions and recommendations with respect to areas in which it has felt the quality of the consultative

process could be enhanced and, in this regard, will be providing further guidance with respect to the process and to health effects data and the role of economic analysis in the setting of standards in other advisory memoranda.

In the present context, council urges that, where a regulatory option has potentially discriminatory effects, the discriminatory potential be identified and comments solicited on how these negative effects might be mitigated.

ACOHOS RECOMMENDATION 84-11

that the Minister of Labour, in circumstances where economic and/or technological factors may mean that a 'most protective' standard is not feasible or practical for a substance or agent that is a reproductive hazard,

- demonstrate the economic and/or technological unfeasibility or impracticality of such a standard;
- examine the risks and costs inherent in alternative options, including potential discriminatory effects and compensation costs; and
- solicit comments on the above before choosing an alternative measure.

The economic and technological feasibility of compliance with particular standards may vary across the industrial settings in which a given hazard arises. Some employers may be able to meet their obligations under the regulations only with considerable difficulty and expense. However, in other cases, depending on the nature of the use of a substance in a workplace, there may be industries or employers for whom compliance with much lower levels may be more readily feasible. Where it is demonstrated that it is not feasible to establish a single 'most protective'standard, council believes that the ministry should give consideration to additional measures designed to reduce exposure levels below those stipulated in the standard.

A combination of mechanisms are possible by which this onus could be created in the regulations and by which administration by the ministry could be facilitated. In the regulation of vinyl chloride as a designated substance, the ministry saw fit to include a provision requiring employers to maintain exposures at the lowest practical level below the mandated exposure limit. The asbestos regulation, on the other hand, included a provision stipulating that the employer ensure that the time-weighted average exposure of a worker to airborne asbestos is reduced to the lowest practical level and not exceed the mandated exposure limit. A variation of such a principle aiming for the achievement of lower exposure or of a 'most protective' standard where reasonably achievable, which may be applicable across the board or be warranted in certain industries or circumstances, should be given consideration where a single 'most protective' standard is not established.

ACOHOS RECOMMENDATION 84-12

that the Minister of Labour take the necessary steps to ensure that, in the development of workplace exposure standards for reproductive hazards for which it is demonstrated that it is not feasible to establish a 'most protective' standard, consideration be given to the application

of further additional measures designed to reduce exposure levels below those stipulated in the standard.

Temporary Removal and Related Issues

Despite their discriminatory potential, options involving the removal of workers at risk from reproductive hazards may need to be considered in certain circumstances:

a) where uncertainty regarding the magnitude of risk is so great that no judgement regarding a 'safe' exposure level (other than zero exposure) can be made, and/or
b) where the technology necessary to achieve a 'safe' (including zero) exposure level is either unavailable or is more costly than the removal option, even taking into account the compensation costs associated with removal and the potential adverse effects on the employment of workers at risk.

Each of these types of circumstances requires comment. Regarding b), we would emphasize again the importance of weighing the *full* social costs of the removal option against the costs of achieving safe exposure levels.

Regarding a), even more difficult matters of judgement arise. Where uncertainty regarding the magnitude of the risk is the rationale for removal, cases are bound to occur in which there is profound disagreement as to the 'threshold' of certainty at which any action at all need be taken. If there is uncertainty, not about the precise level at which exposure to a substance is harmful, but about whether a substance is hazardous *at all* (or whether it is hazardous at any conceivable occupational exposure level), the judgement of whether removal of workers is warranted is particularly difficult. These difficulties in judgements are likely to be compounded by public anxieties about uncertain health hazards and by the desire to 'err on the side of caution' where the individuals likely to bear the risk (the unborn) are obviously extremely vulnerable, and are incapable of 'informed consent'. Council itself has wrestled with these issues in arriving at its recommendations regarding video display units, and recognizes the difficulties of developing equitable and practical responses to such situations. Some of the difficulties that arise in a case-by-case consideration of these issues would be mitigated by the development of a general program to deal with the removal of workers faced with reproductive hazards. Such a program could be designed to reduce the perverse incentives and discriminatory potential of responses developed on a piecemeal basis.

Ideally, collective agreements and/or changing patterns in the workplace will ultimately result in more widespread provision for early leave, reassignment or sabbatical arrangements (perhaps in conjunction with continuing education and training), which would accommodate family planning and ensure protection during the very early stage of pregnancy before the pregnancy has been confirmed. As a minimum, however, where it has not been practical or feasible to achieve a single 'most protective' standard and where a *pregnant* worker may be exposed to a reproductive risk, council is of the opinion that the worker should be offered temporary reassignment, if available, with appropriate compensation. (The issue of compensation is discussed below). A worker may, in fact, prefer to make use of protective

equipment to avoid a hazardous level of exposure as an alternative to temporary reassignment. Where the use of protective equipment does not, in itself, pose a hazard to pregnancy, this alternative should be available at the option of the worker.

ACOHOS RECOMMENDATION 84-13

> that the Minister of Labour take steps to ensure that, where it is demonstrated that a pregnant worker may be exposed to a reproductive hazard at a level that may be injurious to the fetus and where the achievement of exposure levels protective of the fetus is not economically or technologically feasible, employers be required to offer pregnant workers alternative work, if available, at appropriate compensation.

The issue of what constitutes 'appropriate' compensation raises a number of considerations. There are at least two bases for arguing that pregnant workers removed from reproductive risks should not suffer financially as a result of removal. In the first place, it is in the interest of the individuals affected, as well as in the broader social interest, that the health of the fetus not be jeopardized because of the reduced economic circumstances of the mother. Secondly, it is important that pregnant women not have a financial incentive to remain in hazardous situations.

In large diversified workplaces, temporary reassignment without financial loss may not present undue difficulty. In smaller or less diversified situations, however, alternative work at similar remuneration may not be available. In such circumstances, maintaining the pregnant worker's income would require 'topping up' remuneration or, indeed, providing full compensation throughout pregnancy while the worker is absent from the workplace.

If individual employers were to be required to provide such compensation, they might well be reluctant to employ women of childbearing capacity. To reduce these disincentives, some spreading of the costs would be desirable.

Some components of such a scheme are already appearing, at least in principle. *The Workers' Compensation Act*, which was set up as a (non tort) mechanism for compensating workers physically injured in the workplace, has had its application gradually extended into the area of industrial disease, and, more recently, provisions of newly promulgated designated substance regulations potentially alter its application further. The designated substance regulations, in principle, presently provide that where a worker is removed from exposure to a designated substance because a physical examination or clinical test discloses that the worker may have, or has, a condition resulting from exposure and suffers a loss of earnings occasioned thereby, the worker is entitled to compensation for the loss in the manner and to the extent provided by *The Workers' Compensation Act*. Council has been advised by the board* that when adjudicating such claims, the board observes the standard set and the results of physical examinations and clinical tests. As a further provision of the designated substance regulation for lead, women capable of bearing children must now be removed from lead exposure when the blood lead concentration is found to exceed 0.40 mg/L. The board has further advised council that the same principles are also followed

* See correspondence, Appendices A and B

in adjudicating lead exposure claims from pregnant women or women capable of bearing children, and although the board has not, as yet, encountered any claims for mercury exposure of women capable of bearing children, the general principles that apply to claims for lead exposure would also apply to claims for exposure to mercury.

This principle is further extended in Québec under the *Act respecting occupational health and safety*. That Act provides that a pregnant or breastfeeding worker, upon presentation of a physician's certificate (issued in accordance with the provisions of section 33 of the Act) attesting that working conditions may be physically dangerous to her unborn child or to herself by reason of her pregnancy or to the child she is breastfeeding, is entitled to the right of protective reassignment or, if this is not possible, to stop working. In the event a worker exercises her right and stops working, an indemnity payable to the worker is paid by the Commission de la santé et de la sécurité du travail du Québec and charged to Québec employers as a group. The funds required for paying this indemnity are drawn from the special fund created pursuant to paragraph 2, section 99 of the *Workmen's Compensation Act*.

Funding such programs through workers' compensation would spread costs across employers, but could still leave groups of employers faced with disincentives to hire women. Council is also aware that the current review of workers' compensation in Ontario is likely to have an impact on the scope of such programs. The question of whether programs of compensation in cases of removal from reproductive hazards should be added to the Workers' Compensation Board's responsibility would have to be considered in the context of the total range of programs that can appropriately be funded through workers' compensation. In light of these considerations of employer incentives and WCB responsibilities, it may be judged preferable to spread costs across a broader social base by funding such programs, at least in part, from general tax revenue.

The costs of such a program, however they are spread, could be substantial. Unfortunately, it is impossible to estimate those costs without better knowledge of 1) the proportion of jobs that involve reproductive risk, in which the achievement of a 'most protective' level is not economically or technically feasible and where alternative work at similar compensation is not available; and 2) the tendency of women of childbearing capacity to flow into those jobs if the risk barrier were to be lowered.

Some members of council feel that the costs of a program of reassignment or removal of pregnant workers from reproductive risk at full compensation are worth bearing, particularly when those costs are compared to the monetary and non-monetary costs of congenital abnormalities. Other council members feel that, since this option is not generally available to workers in other situations and since a general application of the full compensation principle would be prohibitively expensive, significant inequities would be created by offering special benefits to pregnant workers. Although council is thus not agreed on the level of compensation, it is agreed on the desirability of developing a program of compensation for pregnant workers removed from reproductive hazards where alternative work at similar remuneration is not available.

*ACOHOS RECOMMENDATION 84-14**

> that the Minister of Labour consult with the Workers' Compensation Board and/or other government agencies to establish arrangements that would ensure that, where it is demonstrated that a pregnant worker may be exposed to a reproductive hazard under conditions as set out in ACOHOS Recommendation 84-13 and where alternative work is not available, the pregnant worker will be entitled to take leave from the workplace at appropriate compensation.

Worker Information

At minimum, and in order that other protective measures function well, workers need to be informed of reproductive risks entailed in their jobs. Similarly, women exposed to substances or agents hazardous to a breastfed child should be so informed and, if protective measures are not feasible, advised against breastfeeding. It is, however, difficult to provide information about uncertain hazards without raising undue alarm. In this area, the ministry might consult with industry and labour organizations in Canada and in other countries in developing and disseminating informative materials.

The development of chemical inventories at the workplace level would also seem to be fundamental to the success of such arrange-ments. This issue, however, goes beyond the scope of this memorandum, and may be considered further by another task force of council.

ACOHOS RECOMMENDATION 84-15

> that the Minister of Labour take the necessary steps to make it a requirement that all workers who are employed in areas where they may be exposed to substances or agents that are reproductive hazards or hazardous to a breastfed child shall be so informed initially and on a regular basis.

ACOHOS RECOMMENDATION 84-16

> that the Minister of Labour keep, within the ministry, updated information on the effects of reproductive hazards and hazards to the breastfed child and make such information available on request.

Workplace Assessments

The designated substance regulations include a requirement (in accordance with section 6 of the current regulations) for a workplace assessment to be made that takes into account the extent and potential extent of the expo-

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* Dr. Walter Curlook wished to have it recorded that he was not in agreement with ACOHOS Recommendation 84-14 as written, and recommended the wording as follows:

> 'that the Minister of Labour consult with provincial and federal government agencies to establish arrangements that would ensure, where it is demonstrated that a pregnant worker may be exposed to a reproductive hazard under conditions as set out in ACOHOS Recommendation 84-13 and where alternative work is not available, that the pregnant worker will be entitled to take leave from the workplace at appropriate compensation.'

sure of a worker to the substance designated. There is also provision (section 8) that further assessments be made when a change in the workplace could result in a significant difference in worker exposure. There are a number of purposes for which it would be beneficial to have the workplace assessments include information as to which jobs, if any, would be considered to include exposure to a known reproductive hazard at levels in excess of the 'most protective' level (to the extent that such is identified by the ministry) and which would necessitate differential treatment in respect of the employment or placement of men, women capable of bearing children, or pregnant or breastfeeding women.

Such information, particularly if made available to the ministry, would provide a more comprehensive data base than presently exists on the extent of exposure of men and women to known reproductive hazards and would assist in an assessment of the extent to which exclusion or reassignment of vulnerable workers may be necessary. It would make more clearly apparent the risks and costs involved in failing to establish a single 'most protective' standard, identify problem areas and assist in assessing where there is potential for reduction in exposure levels. It would also provide a useful basis for any ministry actions undertaken to help ensure that workers are informed about reproductive hazards in accordance with ACOHOS Recommendation 84-15. In the event that the ministry were to incorporate further additional measures in a standard in order to reduce exposure levels below those stipulated in the standard (e.g. in accordance with ACOHOS Recommendation 84-12), the information from workplace assessments would facilitate administration and appropriate enforcement.

At present there is no requirement for workplace assessments to be filed with the ministry. It would therefore seem logical and desirable that the assessments be sent to the ministry, thus informing them of establishments handling designated substances and of completing the information loop. In creating an onus on employers to initiate contact with the ministry, a method that the ministry has already taken some steps to introduce, failure of the ministry to receive a copy of the initial assessment could assist in the identification of employers not yet in compliance with the regulations. Furthermore, should it become apparent to the ministry, based on new health effects data, that exposure levels should be lowered, a more comprehensive data base would then be available that would be of assistance in assessing the economic effect of such a move and in identifying areas where workers may be at risk.

Again, the issue of the filing of workplace assessments with the ministry has implications beyond the scope of this memorandum, and may be considered in more detail by another task force of council.

ACOHOS RECOMMENDATION 84-17

> that the Minister of Labour take steps to ensure that workplace assessments required in accordance with designated substance regulations (currently sections 6 and 8), include, in future, a statement as to which jobs, if any, would be considered to include exposure to a reproductive hazard at levels in excess of the 'most protective' level and which would necessitate differential treatment in respect of the employment or placement of men, women capable of bearing children, or pregnant or breastfeeding women.

Acknowledgements

Council is grateful to the members of the Task Force on Women and Occupational Health and Safety for their valuable input. The task force included the following members of the advisory council: Dr. G. J. Stopps (Chairman), Mrs. N. Caldbick and Mr. J. M. More. Members of the task force who were not on council were: Ms. S. Bobier, Ortho Pharmaceutical (Canada) Ltd., and Mr. R. DeMatteo, Ontario Public Service Employees Union.

The Workmen's Compensation Board
2 Bloor Street East, Toronto, Ontario M4W 3C3
Telephone (416) 965 8880

Lincoln M. Alexander, Q.C.
Chairman

February 3, 1983.

Dr. J. F. Mustard,
Chairman,
Advisory Council on Occupational
Health and Occupational Safety,
400 University Avenue,
Toronto, Ontario
M7A 1T7

Dear Dr. Mustard:

Further to my January 21, 1983 acknowledgement of your letter of January 14, 1983, I am pleased to provide you with the following information.

Generally, workers who have been exposed to lead in their employment are considered eligible for compensation benefits under the Workers' Compensation Act when they develop blood lead concentrations and clinical findings that warrant their removal from exposure employment and as the result of such removal incur a wage loss.

When adjudicating such claims, the Board observes the standards concerning acceptable blood lead levels stipulated in the Regulation respecting lead, and the symptoms or signs of lead intoxication described in the medical reports submitted and/or the results of any additional tests are also of primary importance in the adjudication process. The same principles are also followed in lead exposure claims from pregnant women or women capable of bearing children.

The Board has not as yet encountered any claims for mercury exposure in women capable of bearing children but the general principles that apply to claims for lead exposure would also apply to claims for exposure to mercury.

I trust that the above information will be of assistance to you.

Yours sincerely,

LMA/av

APPENDIX B

Ontario

Advisory Council on Occupational Health & Occupational Safety

Office of the Chairman

400 University Avenue
Toronto, Ontario
M7A 1T7

416/965-2448

January 14, 1983

The Honourable L. M. Alexander, QC,
Chairman of the Board
The Workmen's Compensation Board
2 Bloor Street East
TORONTO, Ontario
M4W 3C3

Dear Mr. Alexander:

The Advisory Council has a task force on women and occupational health and safety and the chairman of that task force has brought to my attention a matter needing clarification. In this regard, it would be appreciated if you could provide information as to what the policy of the Workmen's Compensation Board would be in the following circumstances as outlined.

According to the Regulation respecting Lead (Code for Medical Surveillance - Section 4(1)(a)(i), it is now mandatory that women capable of bearing children be removed from lead exposure when their blood lead concentration is found to exceed 0.40 mg/L. It is my understanding that, acording to Section 16(2) of the regulation, where the employer cannot place her in 'no lead exposure' work, and loss of earnings results, she is entitled to workmen's compensation. I hope you might confirm the accuracy of this view and, as well, whether the same would apply should women capable of bearing children be removed from mercury exposure in keeping with the provision in that regulation that 'Exposure)to mercury) of females capable of bearing children should be kept to a minimum.'

You have no doubt noted a recent legal opinion from the Ministry of the Attorney General that there is no distinction between a pregnant worker and her unborn child for the purposes of Section 23 (which deals with the worker's 'right to refuse') of the Occupational Health and Safety Act, and that risk to the fetus is attributed to the mother. This interpretation has given rise to the question of whether a pregnant worker removed from lead exposure (Section 5 of the Code for Medical Surveillance for Lead) would be entitled to workmen's compensation benefits.

I gather no relevant claims have as yet arisen, however, I would be very grateful for clarification as to what Board policy would be in these instances. I am enclosing a copy of the wording of the legislation noted as well as the terms of reference and membership of the task force.

Yours very truly,

J. F. Mustard
Chairman

Attachments

Code for Medical Surveillance for Lead

4(1)(a)(i) In order to safeguard a developing fetus a woman capable of bearing children must be removed from lead exposure when the blood lead concentration is found to exceed 0.40 mg/L.

Regulation respecting Lead

16. (2) Where a worker is removed from exposure to lead because a physical examination or clinical test discloses that the worker may have or has a condition resulting from the inhalation, ingestion or absorption of lead and suffers a loss of earnings occasioned thereby, the worker is entitled to compensation for the loss in the manner and to the extent provided by the Workmen's Compensation Act.

Code for Medical Surveillance for Lead

5. Health Education

Personal cleanliness is important and workers must be advised of the danger of eating, drinking and smoking in lead-exposed areas. All workers must be made aware of the hazards from lead and their examination results must be discussed.

Women workers should be encouraged to notify the employer and the examining physician as soon as possible if they become pregnant. When a physician is informed that a worker is pregnant, the physician must advise the worker and the employer whether the worker should be removed from further exposure to lead.

Regulation respecting Mercury

16. (2) Where a worker is removed from exposure to mercury because a physical examination or clinical test discloses that the worker may have or has a condition resulting from the inhalation, ingestion or absorption of mercury and suffers a loss of earnings occasioned thereby, the worker is entitled to compensation for the loss in the manner and to the extent provided by the Workmen's Compensation Act.

Code For Medical Surveillance for Mercury

5. Health Education

Personal cleanliness is important and workers must be advised of the danger of eating, drinking and smoking in mercury-exposed areas. All workers must be made aware of the hazards of mercury and their examination results must be discussed. Exposure of females capable of bearing children should be kept to a minimum.

Office of the
Minister

Ministry
of
Labour

400 University Avenue
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(416) 965-4101

August 20, 1984

Dr. D. R. McCalla
Chairman
Advisory Council on Occupational Health
and Occupational Safety
400 University Avenue
Toronto, Ontario
M7A 1T7

Dear Dr. McCalla:

Thank you for your letter of August 3, 1984, submitting to me Advisory Memorandum 84-II, "Concerning Reproductive Hazards in the Workplace".

As you indicate in your letter, the issues addressed by the memorandum are complex and the Advisory Council has had to consider many factors. The memorandum is under review by my officials and I will forward a final reply to the Council's advice in the near future.

Please extend my thanks to Council and Task Force members for their diligence in the preparation of this memorandum.

Yours sincerely,

R. H. Ramsay
Minister

Ontario

Office of the Minister

Ministry of Labour

400 University Avenue
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M7A 1T7
(416) 965-4101

November 22, 1984.

Dr. D.R. McCalla,
Chairman,
Advisory Council on Occupational
Health and Occupational Safety,
400 University Avenue, 15th Floor,
Toronto, Ontario,
M7A 1T7.

Dear Dennis:

A preliminary review of Advisory Memorandum 84-II, concerning Reproductive Hazards in the Work Place has now been completed by my officials. At present, I am unable to forward a final reply to Council with respect to the advice set out in the advisory memorandum, as there are several points on which I would appreciate some clarification.

It seems to me that a meeting with Council members would enable my officials and I to pursue this matter within a reasonable time frame. I should appreciate your early advice as to whether you would consider this an appropriate manner in which to proceed.

Yours sincerely,

R.H. Ramsay,
Minister.

Ontario

Advisory Council on Occupational Health & Occupational Safety

Office of the Chairman

400 University Avenue
Toronto, Ontario
M7A 1T7
416/965-2448

December 14, 1984

The Honourable R. H. Ramsay
Minister of Labour
400 University Avenue
14th Floor
TORONTO, Ontario
M7A 1T7

Dear Mr. Ramsay:

Thank you for your letter of November 22, 1984 in which you suggest a meeting with council members regarding Advisory Memorandum 84-II concerning Reproductive Hazards in the Workplace.

Council has considered your suggestion and would be agreeable to meeting with you and your officials in order to obtain a clear and detailed understanding of the points on which you seek clarification.

Council would appreciate receiving an outline of those points in writing prior to the meeting and will likely wish to provide you with a written response after having an opportunity to deliberate on any matters you raise.

I look forward to receiving your communication on this matter so that arrangements may be made for a meeting at an early date.

Yours truly,

D. R. McCalla
Chairman

cc to: T. E. Armstrong, Q.C.
A. E. Robinson
B. Goodman

Office of the
Minister

Ministry
of
Labour

400 University Avenue
Toronto Ontario
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(416) 965-4101

January 9, 1985

Dr. D. R. McCalla
Chairman
Advisory Council on Occupational Health
and Occupational Safety
400 University Avenue, 15th Floor
Toronto, Ontario
M7A 1T7

Dear Dr. McCalla:

Thank you for your letter of December 14, 1984. I am pleased that Council is agreeable to a meeting. You have requested a written outline, prior to the meeting, of the points on which I would like clarification, with respect to Advisory Memorandum 84-II, Concerning Reproductive Hazards in the Workplace.

In view of the technical nature of the points in question, I have asked Dr. Ann Robinson, the Assistant Deputy Minister of the Occupational Health and Safety Division, to respond to your request. May I suggest that the meeting to discuss the points be attended by Dr. Robinson, on my behalf.

Again, my thanks to Council for the work involved in preparing the Advisory Memorandum.

Yours sincerely,

R. H. Ramsay
Minister

Advisory Council on Occupational Health & Occupational Safety
Ontario

Conseil consultatif de la santé et de la sécurité au travail

Office of the Chairman

Bureau du président

400 University Avenue
Toronto, Ontario
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416 965-2448

May 9, 1985

The Honourable R.H. Ramsay
Minister of Labour
400 University Avenue, 14th Floor
TORONTO, Ontario
M7A 1T7

Dear Mr. Ramsay:

Following receipt of your letter of January 9 and that of Dr. Robinson of January 18, 1985 (attached), council met with Dr. Robinson to obtain a clearer understanding of issues on which clarification was being sought.

The first of these related to definitions of reproductive hazard and reproductive risk and the parameters of council's Advisory Memorandum 84-II concerning reproductive hazards in the workplace. In the context of that document, *reproductive hazard* refers to a substance or agent which is considered to cause an adverse reproductive effect in humans. *Reproductive risk* refers to the probability that exposure to a substance or agent will cause an adverse reproductive effect.

Council was concerned with both pre-conception and post-conception and had felt that it was clear that the advisory memorandum addressed reproductive hazards with respect to both men and women.

It is acknowledged that hazards to the breastfed child are not a part of reproductive hazards per se and in the advisory memorandum reproductive hazards are generally differentiated from hazards to the breastfed child. However, issues relating to breastfeeding were seen as a logical and direct extension of issues raised during council's consideration of workplace hazards which may affect the offspring of exposed workers and so the nursing child is included in what the document refers to as the 'reproductive chain'.

Dr. Robinson raised with council questions with respect to interpretation of animal and human data, criteria to be applied to arrive at a 'single most protective standard', and how to proceed where there is a deficiency of scientific information.

Council acknowledges the complexity of the task facing the ministry in dealing with those issues; dimensions of which are not unrelated to those encountered by the ministry in the development of regulations for the control of toxic substances in general. Council wishes to stress, however, that it did not set out to answer those specific questions in that advisory memorandum. The emphasis in the document was on process and on policies and procedures and their impact on individuals. Council was concerned about the importance of adhering to a presumption in favour of a 'single most protective standard', exclusionary policies and their impact, and mechanisms for ensuring that appropriate attention is directed to the negative effects of moving away from a single most protective standard. The deficiency of scientific data and the considerable uncertainty associated with reproductive hazards have influenced the treatment of this issue in the workplace and make it particularly important that the broad range of implications be adequately considered.

Intended purposes of council's recommendation 84-17 concerning workplace assessments were described in some detail in the advisory memorandum. It is not clear to council, however, the extent to which the purposes cited are now met under the current designated substance regulations.

I trust the foregoing and the meeting with council have served to provide clarification of the advisory memorandum.

Yours truly,

D. R. McCalla
Chairman

Attachment

cc to: T.E. Armstrong, Q.C.
Dr. A.E. Robinson
B. Goodman

Ontario Ministry of Labour
Ministère du Travail de l'Ontario

Occupational Health and Safety Division
14th Floor, 400 University Avenue
Toronto, Ontario
M7A 1T7

January 18, 1985

Dr. D.R. McCalla
Chairman
Advisory Council on Occupational Health
and Occupational Safety
400 University Avenue, 15th Floor
Toronto, Ontario
M7A 1T7

Dear Dr. McCalla:

I am writing in response to your letter of December 14, 1984, to the Minister, in which you requested an outline of the points to be discussed at a meeting with Council members, with respect to Advisory Memorandum 84-II, Concerning Reproductive Hazards in the Workplace.

The first point on which clarification is sought pertains to definitions and particularly to the terms "reproductive hazard" and "reproductive risk", which are used throughout the memorandum. It would be helpful if Council could provide a clear definition of these terms. In addition, an outline of the changes within the male and female reproductive systems, the developing embryo and fetus and in the nursing child, which are thought to constitute an adverse response to work place factors, would be of particular assistance.

The second point upon which clarification from Council would be appreciated concerns the fundamental problem caused by the limited scientific knowledge and understanding of the nature and actions of substances that are potential hazards to the physiological processes of reproduction and embryonic and fetal development. In recognition of this problem, Council has suggested that, as a general principle, judgement with respect to the potential hazard of a given substance, should be made on the side of caution.

However, further clarification on the following would be appreciated:

- what scientific evidence is required to identify a substance as a hazard to reproduction;
- what weight is to be accorded negative evidence; and

- o how should the available animal and human data be interpreted.

Finally, with respect to the recommendations set out in the memorandum, I would ask Council for clarification of the intent of, and rationale for, Recommendation 84-17. It is unclear how Recommendation 84-17 will serve the purposes cited in the memorandum to any greater extent than already served under the current structure of designated substance regulations.

I look forward to discussing these points in greater detail at an early meeting with Council members.

Yours sincerely,

A. E. Robinson
Assistant Deputy Minister

Advisory Memorandum 84-III

Office of the
Minister

Ministry
of
Labour

400 University Avenue
Toronto, Ontario
M7A 1T7
(416) 965-4101

April 18, 1984

Dr. D. R. McCalla
Chairman
Advisory Council on Occupational Health
and Occupational Safety
400 University Avenue, 15th Floor
Toronto, Ontario
M7A 1T7

Dear Dr. McCalla:

As you know on November 13, 1982 I published a Notice of Intention to designate Acrylonitrile along with seven other substances. On August 6, I published a proposed regulation for Acrylonitrile in The Ontario Gazette. Following public comment, my officials presented a revised Acrylonitrile Regulation to interested parties at an open review meeting held on October 18, 1983. Since then my officials have been reviewing the comments that were made at that meeting and subsequently in briefs submitted to the Minister. As a result, I enclose a copy of the revised Acrylonitrile Regulation and my officials' "Report to the Advisory Council on the Designation of Acrylonitrile in Ontario".

I look forward to receiving Council's comments on the consultative process followed by my officials in developing the proposed regulation and codes for Acrylonitrile.

Officials of the Occupational Health and Safety Division would be pleased to meet with Council members to discuss this matter at your earliest convenience.

Yours sincerely,

Russell H. Ramsay
Minister

Encl.

Ontario

Advisory Council on Occupational Health & Occupational Safety

Office of the Chairman

400 University Avenue
Toronto, Ontario
M7A 1T7
416/965-2448

May 8, 1984

The Honourable R. H. Ramsay
Minister of Labour
400 University Avenue, 14th Floor
TORONTO, Ontario
M7A 1T7

Dear Mr. Ramsay:

This will acknowledge receipt of your letter of April 18, 1984, forwarding the "Report to the Advisory Council on the Designation of Acrylonitrile in Ontario" and the proposed acrylonitrile regulation and codes for Council's review.

As you know, Council's Task Force on Principles and Procedures for Setting Standards and Regulations is presently reviewing the process followed in the development of the proposed benzene regulation. Consistent with past practice, Council will be proceeding to complete its review of the proposed benzene regulation before fully undertaking its review of the proposed regulation for acrylonitrile unless you advise to the contrary.

Yours truly,

D. R. McCalla
Chairman

cc to: T. E. Armstrong, QC
Dr. A. E. Robinson
Mr. B. Goodman

Office of the Minister

Ministry of Labour

400 University Avenue
Toronto, Ontario
M7A 1T7
(416) 965-4101

May 22, 1984

Dr. R. McCalla
Chairman
Advisory Council on
Occupational Health and
Occupational Safety
15th Floor
400 University Avenue
Toronto, Ontario
M7A 1T7

Dear Dr. McCalla:

Thank your for your letter of May 8, 1984 concerning the acrylonitrile regulation.

I appreciate that Council's Task Force is presently reviewing the process followed in the development of the proposed benzene regulation. In keeping with past practice of Council, I look forward to receiving your advice on acrylonitrile once your work on benzene has been completed.

Thank you for your continuing efforts to proceed in an expeditious manner with the review of these regulations.

Yours sincerely,

R. H. Ramsay
Minister

Ontario

Advisory Council on Occupational Health & Occupational Safety

Office of the Chairman

400 University Avenue
Toronto, Ontario
M7A 1T7
416/965-2448

September 20, 1984

The Honourable R.H. Ramsay
Minister of Labour
400 University Avenue, 14th Floor,
TORONTO, Ontario
M7A 1T7

Dear Mr. Ramsay,

Enclosed is A Review by the Advisory Council of the Process Used to Develop a Standard for Acrylonitrile and Council's Evaluation of the Criteria Utilized to Assess the Hazard of Exposure to Acrylonitrile in the Workplace.

During its review of the ten proposed designated substance regulations to date, council has noted the evolution of a relatively standard process and format especially for substances designated at the same time (benzene and acrylonitrile) and with similar properties and uses (vinyl chloride and acrylonitrile). Hence many of the questions and concerns council has are common to other proposed regulations and many have been addressed in previous advisory memoranda.

A number of general issues arose during the review of the proposed acrylonitrile regulation and council's evaluation of the criteria utilized to assess the hazard of exposure to acrylonitrile in the workplace, e.g.

- the reasons the substance was chosen as a high priority for designation
- the extra protection offered to exposed workers resulting from the substance (acrylonitrile) being the subject of a designated substance regulation
- the rationale for, and content of, the Code for Medical Surveillance
- the accuracy and reproducibility of data gathered by 1) consultants, 2) trade associations and/or industry, and 3) ministry personnel
- council's role in the process of developing regulations and standards for designated substances

As these issues are general to the process of designating substances, council feels that they would be more appropriately dealt with by the Task Force on Criteria and Alternative Approaches for the Control of Hazardous Substances and Agents in the Workplace.

For this reason the enclosed report is very brief and restricted to a summary of the concerns which are specific for the development process of the acrylonitrile regulation and associated codes.

Yours truly,

D. R. McCalla
Chairman

Encl.
cc to: T. E. Armstrong, Q.C.
Dr. A. E. Robinson
A. L. Gladstone
B. Goodman

Advisory Memorandum 84-III to the Minister of Labour September 17, 1984

A Review by the Advisory Council of the Process Used to Develop a Standard for Acrylonitrile and Council's Evaluation of the Criteria Utilized to Assess the Hazard of Acrylonitrile Exposure in the Workplace

Council's review of the standard setting process leading to the development of the acrylonitrile regulation focused on three aspects of the process: 1) the analysis of the background documentation (i.e. whether the ministry assembled, reviewed and analysed the available evidence in a reasonable fashion and whether the conclusions reached were compatible with the evidence), 2) the process (i.e. whether the public was provided with sufficient time, information and opportunity to comment on, and participate in, the development and content of the regulation), 3) the application (i.e. whether the regulation and codes are internally consistent and whether the intent of the ministry is expressed in a clear and unambiguous fashion).

As in the past, council has conducted the review considering the list of basic principles and procedures suggested in council's Advisory Memorandum 78-II.

BACKGROUND

In 1979 the ministry contracted consultants to gather information on the use and health effects of exposure to acrylonitrile. The consultants' report, which considered health effects, use in Ontario, the number of workers exposed and the standards in other jurisdictions, was reviewed by ministry personnel and a Notice of Intention to Designate was published in November 1982. The briefs, which were received in response to the Notice of Intent to Designate, were reviewed, and in July 1983 the Legislation Review Committee of the Occupational Health and Safety Division recommended designation of acrylonitrile. A draft regulation was published in August 1983. More briefs were received, and a meeting was held with a trade association. A revised draft was presented and explained at an open review meeting in October 1983. Attendees at the meeting were asked for comments on further changes that were under consideration. A number of acrylonitrile polymer processing plants were surveyed. Further revisions were incorporated into the proposed regulation, which was submitted to the advisory council in April 1984. Following a preliminary review of the proposed regulation and associated codes and of the extensive background material that was presented in the *Report to the Advisory Council on the Designation of Acrylonitrile in Ontario*, the task force sought clarification regarding the purpose and justification of the code for medical surveillance (Appendix I). The response (Appendix II) was received in August 1984.

1. Analysis of the Background Documentation

a) *Health Effects*

The ministry's review of the health effects data appeared to be comprehensive. The conclusion that acrylonitrile should be classified as a

suspect human carcinogen is in agreement with the IARC classification. However, council does not agree that there is good evidence to indicate that chronic acrylonitrile exposure causes liver dysfunction. Council agrees that the decision not to heed the risk assessment as performed by the U.S. Environmental Protection Agency (EPA) is prudent in view of the associated uncertainties.

b) *Exposure to Acrylonitrile in Ontario*

The present Ontario guideline for acrylonitrile exposure is two ppm. This is the same as the standard in the United States and the internal guidelines for the major acrylonitrile users. Considering this, the conditions of exposure and the number of workers exposed, council questions the rationale for designating acrylonitrile and setting the exposure level at two ppm, and wonders what added protection will be afforded to these workers. It is acknowledged that it was important to perform a survey of the acrylonitrile polymer processors to determine the exposure experienced by workers in these plants. However, concern was expressed at the quality of the presentation and/or analysis of the survey data. Such presentation of data leads a reviewer to question the quality of the data. When the data are used as the basis for major decisions, e.g. whether or not to exempt a major sector of the industries/workplaces where workers have the potential for exposure to toxic substances, it is of utmost importance that the data are accurate, representative, correctly analysed and presented in such a way that they can be reviewed.*

Another concern council has with the background documentation on worker exposure in Ontario is the lack of information on the minor users and the hygiene practices and controls that are in use.

2. **Process**

Since the process used to develop the acrylonitrile regulation appears to be very similar to that used for the benzene regulation, the comments, suggestions and recommendations made in Advisory Memorandum 84-1 also apply to acrylonitrile. It is acknowledged, in the case of acrylonitrile, that the late changes in the exposure limits were not so substantive and they were indicated as being under consideration at the public review meeting. However, it is noted that economic impact data do not appear to have been actively solicited.

Council notes that the information collected from industries and trade associations before publication of the Notice of Intent to Designate indicated that levels of exposure are below one ppm, yet after a one ppm standard was suggested, the same industries appear unable to keep exposures below this level. Council considers it important that the ministry develop a mechanism for obtaining more accurate information from workplaces.

* This concern was communicated to ministry personnel and a revised presentation of the data was submitted to council in August 1984.

3. Application

As the regulation is of the same standard format as previous designated substance regulations, council's concerns regarding its application, the interpretation of the assessments and the requirements for a control program remain the same.

Council's major concern with the acrylonitrile regulation and associated codes is the Code for Medical Surveillance of Acrylonitrile Exposed Workers. The major issues were addressed in a letter to Mr. Armstrong, Deputy Minister (Appendix I). After considering the response (Appendix II), council feels there is insufficient evidence that liver dysfunction and cancer of the stomach and colon can result from chronic acrylonitrile exposure to warrant mandating the nonspecific liver function tests and fecal occult blood test. Ministry personnel acknowledge that the effects are not specific for acrylonitrile exposure, that the tests are not specific for the effects and that further examination will be required at the discretion of the examining physician.

ACOHOS RECOMMENDATION 84-18

that the Minister of Labour ensure that the tests contained in the Code for Medical Surveillance of Acrylonitrile Exposed Workers not be mandatory.

Ontario
Advisory Council on Occupational Health & Occupational Safety
Office of the Chairman

APPENDIX I

400 University Avenue
Toronto, Ontario
M7A 1T7
416/965-2448

July 12, 1984

T. E. Armstrong, Q.C.
Deputy Minister of Labour
Ministry of Labour
400 University Avenue, 14th Floor
TORONTO, Ontario
M7A 1T7

Dear Mr. Armstrong:

Following a preliminary review of the proposed acrylonitrile regulation and related codes, the Task Force on Principles and Procedures for Setting Standards and Regulations wishes to ask for clarification regarding the Code for Medical Surveillance. It was noted that, for the clinical tests required under Regulation, the proposed code suggested liver function tests, faecal occult blood and possible acrylonitrile absorption tests. After reviewing the health effects data, the 'Value and Feasibility of the Medical Surveillance Program' (Appendix F, Volume 3), and the references cited in the latter document, the issue arose:

What is the rationale for the medical surveillance?

Is it to
1) detect exposure?
2) detect health effects due to AN exposure? and/or
3) detect whether a worker is 'fit' to be exposed to acrylonitrile?

The last two reasons assume that the chronic health effects of acrylonitrile exposure are known and that these effects have early subclinical signs which can be detected by clinical tests. Hence, the task force wishes to ask:

1) which of the suggested tests is going to address which of the purposes outlined above?

2) are the tests specific for the above purposes and, if not,

3) how could the results of the tests be interpreted or used, and

4) what clinical tests are currently being performed on workers exposed to acrylonitrile and how specific are these tests for detecting a) exposure to acrylonitrile, b) health effects suspected to be caused by AN exposure?

The answers to these questions will aid the task force in the review of the proposed acrylonitrile egulation and related codes.

Yours truly,

Lorne Heard, Chairman
Task Force on Principles
and Procedures for Setting
Standards and Regulations

cc to: Dr. A. E. Robinson
Mr. Brian Goodman
Mr. A. L. Gladstone
Ms. S. Glasbeek

APPENDIX II

Office of the
Deputy Minister

Ministry
of
Labour

400 University Avenue
Toronto, Ontario
M7A 1T7
416 965-4115

July 26, 1984

Mr. Lorne Heard, Chairman
Task Force on Principles
and Procedures for Setting
Standards & Regulations
Advisory Council on Occupational
Health and Occupational Safety
15th Floor
400 University Avenue
Toronto, Ontario

Dear Mr. Heard:

Thank you for your letter of July 12, 1984, requesting clarification of the rationale for the requirements for medical surveillance contained in the Code for for Medical Surveillance adopted by the proposed acrylonitrile regulation.

I have received a report on this matter from the Occupational Health Branch which I attach for your information.

If you have any further questions on this or other aspects of the proposed acrylonitrile regulation, Ministry officials would be pleased to respond by letter or by meeting with you and your task force members.

Yours truly,

T. E. Armstrong
Deputy Minister

REPORT OF THE OCCUPATIONAL HEALTH BRANCH TO ADVISORY COUNCIL ON OCCUPATIONAL HEALTH AND OCCUPATIONAL SAFETY QUESTIONS ON THE ACRYLONITRILE REGULATION

JULY 24, 1984

The Council Task Force raised the general question of the purpose of the medical surveillance program. As council members may recall, the ministry has received critical comment for the phraseology used in the codes of medical surveillance adopted by the extant designated substance regulations. Ministry officials considered these comments and in the proposed regulations published in July and August 1983 adopted wording which explains the purpose of the medical programs in a more precise manner.

The purpose of the acrylonitrile medical surveillance program is to protect the health of workers by

(a) identifying workers with conditions which may be aggravated by exposure to acrylonitrile and establishing a baseline measure for determining changes in health;

(b) evaluating the effects of acrylonitrile exposure on workers;

(c) enabling remedial action to be taken when necessary;

(d) providing health education.

The Code of Medical Surveillance also provides guidance to the examining physician concerning medical examinations and clinical tests to assist the physician in meeting the above objectives.

The toxicology review, Appendix F, Volume 3 of the report to the Advisory Council provides the rationale for the selection of the clinical tests included in the Code for Medical Surveillance. As you are aware, the Health Effects Study addressed only the risk assessment for cancer in order to recommend an exposure standard but did not address medical surveillance.

Chronic exposure to acrylonitrile has been reported to cause mild liver dysfunction and increased incidence of cancers, particularly in the colon, stomach and lungs. It was prudent, therefore, to propose a medical program that addresses reported and suspected health effects in order to ensure that workers' health is monitored and protected.

A preplacement medical examination will provide a baseline health assessment. At the periodic examination the examining physician may then detect biologic and clinical changes from the baseline assessment. The tests selected are valid for determining the reported health effects, but, it should be noted that toxic effects from acrylonitrile are not unique to the chemical. The physician must pay particular attention to the circumstances of the workers exposure to determine whether or not the results of the test or the condition is likely to be associated with exposure to acrylonitrile.

Mandatory tests include fecal occult blood and liver function. The former is intended for the early detection of gastro-intestinal tract cancer. When positive, further medical investigations would be required. There is no specific action level for removal from exposure, for this decision is made at the discretion of the examining physician. Similarly, the liver function tests may be altered by exposure to acrylonitrile and in such cases, a re-assessment is necessary by the examining physician to determine the fitness for exposure to prevent further liver dysfunction. Each case must be assessed individually.

The acrylonitrile absorption tests are referenced in the Code so that examining physicians may consider using them on a voluntary basis for determining over exposure to the substance. Some of the known tests, e.g. urinary thiocyanates, may be useful in exposure situations when the proposed standards are exceeded during spills or accidents. Others are in the developmental stage and could be of use in the future. X-rays are also voluntary tests to be used when indicated.

Currently, there is no uniform set of clinical tests in the province where acrylonitrile exposures may occur since there are no mandatory medical surveillance requirements and the tests are selected at the discretion of the examining physician. Accordingly, they differ with different physicians and workplaces, as and when workers are examined.

The specificity of the clinical tests in the Code for Medical Surveillance in the proposed acrylonitrile regulation can be compared to that of the clinical tests adopted under the vinyl chloride regulation. In the case of vinyl chloride Council noted in Advisory Memorandum 82-I that several beneficial changes were made to the regulation to ensure that the examining physician was directed towards the

occupational origin of any ill health when considering whether a worker is fit, fit with limitations or unfit for work in exposure to vinyl chloride. As council noted in the Advisory Memorandum, the code for medical surveillance adopted by the vinyl chloride regulation was changed to give the examining physician "the discretion to determine whether a removal is warranted on the basis of test results. In this regard, both Ministry officials and council members agreed that, since liver function tests are not specific to vinyl chloride exposure, they should not be used as the sole criterion to determine when a worker should be removed for a vinyl chloride environment". Similar reasoning underlies the proposed medical surveillance requirements in the acrylonitrile regulation.

In conclusion, medical surveillance will permit the physician to detect health effects suspected to be caused by acrylonitrile exposure, and to determine, in consultation with the worker, the most appropriate course of action.

Office of the
Minister

Ministry
of
Labour

400 University Avenue
Toronto, Ontario
M7A 1T7
(416) 965-4101

December 11, 1984

Dr. Dennis McCalla
Chairman
Advisory Council on Occupational Health
and Occupational Safety
15th Floor, 400 University Avenue
Toronto, Ontario
M7A 1T7

Dear Dr. McCalla:

Thank you for transmitting to me Council's September 20th advice on the proposed acrylonitrile regulation. This letter will constitute my reply to Council's advice.

Council noted that many of its questions and concerns are common to other proposed regulations and have been discussed in previous advisory memoranda. I believe that I have addressed these issues in responses to Council's memoranda, the most recent dealing with the proposed benzene regulation.

It appears that during Council's review of the report on the designation of acrylonitrile several general issues arose. These included:

- the reasons the substance was chosen as a high priority for designation;
- the extra protection offered to exposed workers resulting from the substance (acrylonitrile) being the subject of a designated substance regulation;
- the rationale for, and content of, the Code for Medical Surveillance;
- the accuracy and reproducibility of data gathered by 1) consultants, 2) trade associations and/or industry, and 3) Ministry personnel; and
- Council's role in the process of developing regulations and standards for designated substances.

Since these are fundamental to the designation process, Council believes that it would be more appropriate to secure comments on these topics from the Task Force on Criteria and Alternative Approaches for the Control of Hazardous Substances and Agents in the Workplace. The Ministry agrees with the Council on the importance of these general issues and looks forward to receiving Council's advice.

Specific issues related to the proposed acrylonitrile regulation were raised by Council. The major points concern:

1. the rationale for designating acrylonitrile and the exposure level selected;

2. the accuracy and representativeness of the survey data collected at plants where acrylonitrile-based polymers are processed;

3. the background information on worker exposure among the minor users in Ontario;

4. the need for economic impact data;

5. the development of mechanisms for obtaining more accurate information from industries; and

6. the recommendation that the tests contained in the Code for Medical Surveillance of Acrylonitrile-Exposed Workers not be mandatory.

These issues will be addressed in the above order.

1. **The Rationale for Designating Acrylonitrile and The Exposure Limit Selected**

Council noted that the proposed exposure limit of 2 ppm as a time-weighted average is the same as the current exposure guideline in Ontario, the (OSHA) standard in the U.S. and the internal guidelines for the major users of acrylonitrile. The difference is that Ontario uses a 40-hour time base rather than the 8-hour time base used in other jurisdictions. Council therefore questioned the rationale for designating acrylonitrile and asked what added protection would be afforded to workers.

It should be noted that a number of designated substance regulations, including the proposed acrylonitrile regulation, include an additional requirement to reduce exposure to the "lowest practical level". By this provision the Ministry recognizes that some plants cannot currently meet a level lower than the exposure limit specified in the proposed regulation. However, in other cases where exposures can be reduced below the exposure limit, employers are required to do so. A number of other items of worker protection result when various measures and procedures required by a designated substance regulation are implemented. These include requirements to:

- perform an assessment;
- implement control programs when appropriate;
- consult with the joint health and safety committee;

- provide workers with appropriate training on the hazards associated with exposure to the substance and methods to control exposure;
- have a program of medical surveillance of workers; and
- maintain records of worker exposure and medical surveillance.

Aside from the foregoing, the fundamental significance of this and any other designated substance regulation is that it affords the best, although not the only, regulatory method of protecting workers against excessive exposures. Under a designated substance regulation, once there is evidence that the exposure limit has been exceeded, a presumption arises that a statutory offence has been committed. Guidelines, in and of themselves, may be used as evidence to support a prosecution for a breach of the general duty Section (14(2)) of the Act and/or the particular requirements in the sector specific regulations such as Section 145 of the Regulations Respecting Industrial Establishments. In the latter instances, the prosecution would be under an evidentiary burden, which is far heavier and generally more complex than is the case when prosecuting for a breach of a statutory requirement.

2. **The Accuracy and Representativeness of The Survey Data**

Council agreed that it was important to determine worker exposure to acrylonitrile in plants where acrylonitrile-based polymers are processed into finished products. However, Council noted its concern over the presentation and accuracy of the survey data.

I am told that the purpose of the survey referred to by Council was to determine the extent of worker exposure to acrylonitrile in a representative number of companies that process acrylonitrile-based polymers into finished products. This survey was conducted after the public meeting as a result of requests made by major suppliers of acrylonitrile-based polymers to exempt processors and fabricators of finished products from the regulation. In the course of this survey, field officers of the Occupational Health Branch visited 20 representative plants throughout the province. The air sampling results from this survey are tabulated in the report "Occupational Health Branch Survey of Fabricators" (Appendix G of the Report to the Advisory Council on the Designation of Acrylonitrile in Ontario). Council did not question the accuracy of the data in the table, but it did point out some transpositional errors in the text that arose during the preparation of the draft report. As Council indicated in the memorandum, the Ministry submitted a revised report on this survey in response to Council's comments. I understand that Council did not question the representativeness or the analysis of the survey data.

3. **The Background Information on Worker Exposure Among The Minor Users**

Council expressed concern about the lack of background material on the minor users and the hygiene practices and controls which are in use. I believe that the Ministry has provided this information in its report to Council. Appendix B of this report contains the consultant's report ("Occupational Health Implications of Acrylonitrile in Ontario" by Michael Holliday and Associates) in which the engineering controls and hygiene practices used by minor users are described. To supplement this information and to further clarify the concerns of industry, the Ministry met with the Society of the Plastics Industry of Canada and a number of companies likely to be affected by an acrylonitrile regulation.

I am advised that Ministry officials also visited a number of these companies to confirm what controls were in place and which processes presented problems in meeting a mandated exposure limit. In addition to the above individual visits, the Occupational Health Branch conducted a survey of 20 representative processors of acrylonitrile-based polymers, as noted above. This survey was undertaken to measure the exposure of workers to acrylonitrile in these industries and to determine if the processors such as fabricators, moulders and extruders would warrant an exemption from the regulation as requested by the major producers. I am told that the exposure levels were expected to be low since the only likely source of acrylonitrile is residual amounts of unreacted acrylonitrile in the polymeric materials used by the processors. The findings of the survey confirm data provided by one of the producers which indicated that, in general, personal exposure levels were well below 1 ppm on a time-weighted average basis. However, personal exposures measured in one fabrication plant were in excess of the proposed exposure limit of 2 ppm on a time-weighted average basis. In two other plants, area levels were between 1 and 2 ppm. The survey report also indicated the type and adequacy of ventilation in the plants visited.

My officials believe that a more comprehensive survey project or collection of additional background information would unduly prolong the designation process and would not alter the position of the Ministry that the designated substance regulation for acrylonitrile will apply to both producers and fabricators of acrylonitrile-based polymers.

4. **The Need for Economic Impact Data**

Council commented that economic impact data does not appear to have been actively solicited. The Ministry did obtain such information. Submissions from the major producers indicated that it is currently economically unfeasible for them to establish and maintain exposures at the limit included in the proposed regulation as originally published. Information collected by Ministry officials during plant visits tends to confirm these contentions by industry. It was apparent from the analysis of the collected information that there is even some difficulty

in meeting the 2 ppm exposure guideline in all processes at all times without the use of respirators.

5. **The Development of Mechanisms for Obtaining More Accurate Information from Industry**

My officials and I concur with Council's observation and have taken steps to develop such mechanisms as Council noted in its advice on the benzene regulation to obtain as much information as possible before publishing a draft regulation. The initiatives to collect information on ethylene oxide and benzidine-congener dyes may serve as yard sticks to measure the benefits to be gained by more involvement by the parties themselves in collecting background information on substances.

In addition, during the summer of 1984, I published Notices of Possible Designation in which I requested specific information from industry and other affected parties. In particular, comments were requested on the following topics:

- information which may further define the health risks associated with exposure to a proposed designated compound;
- appropriateness of and basis for an exemption for an industry sector from any or all provisions of a designated substance regulation;
- levels of exposure of workers in the industries producing or consuming a proposed designated substance, and numbers of workers exposed;
- procedures for analyzing the proposed designated substance to allow precise identification of the form of the substance present in a sample, where this is appropriate;
- comments on the appropriate exposure limits (time-weighted average or maximum) for a proposed designated substance and the basis for such limits; and
- comments on the appropriate provisions for medical surveillance of workers exposed to a proposed designated substance, the frequency of medical examinations, and information on current medical programs in place.

The concerns or issues raised in the public comments submitted may be clarified or expanded further by the Ministry holding meetings with interested and affected parties. This public comment process will allow the Ministry to receive more meaningful and relevant information at an earlier stage of a designated substance project. I hope that this, in turn, will result in the public becoming better informed of the hazards of a proposed designated substance and in the Ministry being able to decrease the length of time required to make pertinent decisions regarding a designated substance regulation.

6. **The Recommendation that The Tests Contained in The "Code for Medical Surveillance of Acrylonitrile-Exposed Workers" not be Mandatory**

Council recommended that the clinical tests in the medical surveillance code should not be mandatory. The Ministry does not consider the tests mandatory but acknowledges that the question could arise as to whether the clinical tests outlined in the Code, as worded initially, were mandatory or simply guidance for the physician.

In view of Council's comments, legal staff at the Ministry were asked to review the pertinent sections of the Code. They recommended that the wording be changed to clarify the intention that the clinical tests are not mandatory. The wording in the version submitted to Council is as follows:

"4. Clinical Tests

Clinical tests aid in the assessment of a worker's fitness for exposure to acrylonitrile.

(1) . . .

The frequency of testing depends on the extent of the hazard, as well as the worker's previous test levels and shall be decided by the examining physician."

The proposed changes (underlined) in the corresponding sections are as follows:

"4. Clinical Tests

Clinical tests may aid in the assessment of a worker's fitness for exposure to acrylonitrile.

(1) . . .

The frequency of testing and the use of these tests depend on the extent of the hazard and shall be decided by the examining physician."

I would like to thank Council members for their continuing effort to improve the designated substance regulation process by providing important advice on the acrylonitrile regulation.

Yours sincerely,

R. H. Ramsay
Minister

Advisory Memorandum 84-IV

Advisory Council on Occupational Health & Occupational Safety
Ontario

Conseil consultatif de la santé et de la sécurité au travail

Office of the Chairman

Bureau du président

400 University Ave
Toronto, Ontario
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416/965-2448

April 22, 1985

The Honourable R. H. Ramsay
Minister of Labour
400 University Avenue
14th Floor
TORONTO, Ontario M7A 1T7

Dear Mr. Minister:

On behalf of the Advisory Council, I am pleased to forward council's Advisory Memorandum 84-IV Concerning Policies and Priorities for Dealing With Literacy and Occupational Health and Safety comprising thirteen recommendations of council and the supporting task force document from which the recommendations were adopted.

The issue of illiteracy has broad ramifications, especially in a multicultural society as exists in Ontario. As the task force documents describe, the implications relating to occupational health and safety are significant and diverse and this is reflected in the range of recommendations presented.

I hope this advice will prove useful in the addressing of this issue and will serve to promote the further and widespread activity and consideration warranted by this important topic.

Yours truly,

D. R. McCalla
Chairman

Encl.

cc to: T. E. Armstrong, Q.C.
A. E. Robinson
B. Goodman

Advisory Memorandum 84-IV to the Minister of Labour

Concerning Policies and Priorities for Dealing With Literacy and Occupational Health and Safety

PREAMBLE

Council's recommendations in the area of literacy are as adopted from the support document prepared by council's Task Force on Literacy and Occupational Health and Safety and were developed by the task force in collaboration with council.

The final task force report and appendices follow, and that reference document, along with the council's recommendations which are presented below, form council's advice relating to this important issue to this time.

Recommendations

ACOHOS RECOMMENDATION 84-19
(TASK FORCE ON LITERACY RECOMMENDATION #1)

that the Minister of Labour, as a matter of policy, support and encourage appropriate measures and programs to ameliorate problems of functional illiteracy.

ACOHOS RECOMMENDATION 84-20
(TASK FORCE ON LITERACY RECOMMENDATION #2)

that the Minister of Labour take the necessary steps to ensure, and to ensure it is made clearly known, that it is part of the mandate of joint health and safety committees to consider the literacy situation in the workplace. Where health and safety committees ascertain that there is a literacy problem,

a) they should be encouraged to take appropriate action to overcome the problem including the establishment of literacy upgrading programs;
b) public funds should be made available to support programs that are designed to overcome functional illiteracy, and that are initiated by health and safety committees; and
c) health and safety committees should be encouraged to work closely with agencies that have expertise in adult basic education (ABE) to design programs appropriate to their situation.

ACOHOS RECOMMENDATION 84-21
(TASK FORCE ON LITERACY RECOMMENDATION #3)

that the Minister of Labour encourage, where appropriate, the use and development of audio/visual aids and/or other appropriate methods to facilitate the effective transfer of information with respect to workplace

hazards and the rights and responsibilities of workers and employers under the *Occupational Health and Safety Act*.

ACOHOS RECOMMENDATION 84-22
(TASK FORCE ON LITERACY RECOMMENDATION #4)

that, where existing or new print materials are used to convey occupational health and safety related information to workers and employers, the Minister of Labour take the steps necessary to have the ministry use and encourage the use of materials that are readily understandable by the people for whom they are intended.

ACOHOS RECOMMENDATION 84-23
(TASK FORCE ON LITERACY RECOMMENDATION #5)

that the Minister of Labour consult with appropriate ministries and organizations involved in the delivery of adult basic literacy (ABL) and second language training (ESL/FSL) in order to ensure greater accessibility of information on the availability of resources and options.

ACOHOS RECOMMENDATION 84-24
(TASK FORCE ON LITERACY RECOMMENDATION #6)

that the Minister of Labour take the necessary steps to ensure that appropriate provision is made in the ministry to ensure that workers and employers may be appropriately advised concerning the availability of resources and options for adult basic literacy and second language training.

ACOHOS RECOMMENDATION 84-25
(TASK FORCE ON LITERACY RECOMMENDATION #7)

that the Minister of Labour urge the co-operation of the Ministry of Education and other ministries and/or other educational institutions and agencies to achieve an integration of occupational health and safety matters into adult basic literacy curricula and, in developing such curricula, the Ministry of Education should be advised to consult with agencies already having programs in occupational health and safety, e.g. labour organizations and safety associations.

ACOHOS RECOMMENDATION 84-26
(TASK FORCE ON LITERACY RECOMMENDATION #8)

that the Minister of Labour indicate support for a broadbased 'right to read' campaign to overcome problems of functional illiteracy and urge other elected representatives to join in this support.

ACOHOS RECOMMENDATION 84-27
(TASK FORCE ON LITERACY RECOMMENDATION #9)

that the Minister of Labour take steps to foster the development of a comprehensive scheme that would reduce obstacles that impede individuals from undertaking adult basic literacy and second language upgrading.

ACOHOS RECOMMENDATION 84-28
(TASK FORCE ON LITERACY RECOMMENDATION #10)

that the Minister of Labour initiate a meeting or meetings of appropriate ministries, agencies, and management and worker representatives concerned about occupational health and safety, literacy and second language instruction (to include as a minimum the Ministries of Labour, Education, Community and Social Services and Citizenship and Culture) to discuss, with a view to increasing, provision of more flexible programs in basic literacy and second language instruction suited to the needs of adults. It is noted that the volunteer sector is important in this program area, and provision should be made to encourage sharing of information and resources.

ACOHOS RECOMMENDATION 84-29
(TASK FORCE ON LITERACY RECOMMENDATION #11)

that the Minister of Labour initiate and support further research into matters related to literacy and occupational health and safety and bring the need for further research to the attention of other ministries.

ACOHOS RECOMMENDATION 84-30
(TASK FORCE ON LITERACY RECOMMENDATION #12)

that the Minister of Labour take steps to encourage safety associations, labour organizations, the Workers' Compensation Board and others, including chambers of commerce and small business organizations, to assume increased activity in attending to literacy/occupational health and safety needs.

ACOHOS RECOMMENDATION 84-31
(TASK FORCE ON LITERACY RECOMMENDATION #13)

that the Minister of Labour take steps to report in the legislature on an annual basis, setting out: what is being done, what evidence there is of success or failure, and what the intentions are for the year ahead with respect to literacy and occupational health and safety.

Support Document to Advisory Memorandum 84-IV

March 1984

A report prepared by the Advisory Council's Task Force on Literacy and Occupational Health and Safety: Concerning Policies and Priorities for Dealing With Literacy and Occupational Health and Safety

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Introduction

Recurrent themes in much of the literature dealing with issues and problems of global illiteracy are reflected in a UNESCO (United Nations Educational, Scientific and Cultural Organization) pamphlet in the words 'Literacy is a right, but millions of people are still unaware of that right.' These words would appear to have more significance when viewed in the global context than in the Ontario setting, where the provision of public compulsory education is generally seen as fulfilling what is taken for granted as entitlement to basic education. However, it was increasingly noted over the past decade that the undereducated continue to constitute a considerable proportion of the adult population in Canada and that many could be considered functionally illiterate by normally accepted standards.

Among industrialized countries, this phenomenon has not been unique to Canada. 'By the early '70s, the experience of adult education specialists in UNESCO and studies and assessments carried out in various societies had indicated that in most industrialized countries there was a hard core of 15 to 25 per cent of adults whose educational attainment was well below the requirements of their societies.'[1]

In June 1979, the report of the Commission of Inquiry on Educational Leave and Productivity, chaired by Adams, noted the possibility of a connection between literacy and safety. This report suggested that: 'Because they cannot read and write at acceptable levels, illiterates may be more accident prone thus increasing the cost of health care and Workmen's Compensation.'[2] Commenting on the over-representation of illiterates among the nation's poor and on unemployment and welfare roles, and their lower-than-average rate of participation in the labour force, the Adams report suggested further that 'as one expert notes, a Grade 8 education or less "effectively bars an adult from many occupations, from employment in many companies, and from participation in most forms of vocational training."'[3][4]

The relationship between level of education, level of income and labour force participation presented in census data and referred to in the Adams report has been well documented elsewhere. The *Canadian Fact Book on Poverty*[5] for example, has noted the tendency for the incidence of poverty to increase in inverse proportion to the level of education attained by the family head. In the report entitled *Adult Basic Education and Literacy Activities in Canada*[6] for World Literacy of Canada, Thomas described the lower labour force participation rate of the undereducated (over 10 per cent lower than the national average) and an employment distribution pattern that finds them engaged in the primary resource industries and the construction industry in high numbers relative to the population as a whole. It is apparent that some groups whose first language is not English are among those with higher-than-average rates of under-education and over-representation in a number of 'high risk' industries. Thomas noted that, while Canada ranks as one of the most prosperous countries in the world in terms of

gross national product, standard of living and average wages, these indicators of prosperity do not reflect differences that exist within the country. Thomas commented further that 'geographic, cultural, socio-economic and psychosocial factors acting either separately or combined have resulted in some sectors of Canada's adult population being deprived of educational opportunities.'[7]

Along with an increasing acknowledgement of the relationship between under-education and socio-economic disadvantage, there has been increasing concern, both in the medical field and in the social sciences, about the relationship between health status and socio-economic conditions. For example, a number of studies in the United States indicate that 'among socio-economic variables, years of formal schooling completed is probably the most important correlate of good health . . . This finding emerges whether health levels are measured by mortality rates, morbidity rates, or self-evaluation of health status, and whether the units of observation are individuals or groups.'[8]

Meanwhile, the preamble of the Ontario *Human Rights Code*, 1981 contains the following statement of public policy:

> And whereas it is public policy in Ontario to recognize that every person is equal in dignity and worth and to provide for equal rights and opportunities without discrimination that is contrary to law, and having as its aim the creation of a climate of understanding and mutual respect for the dignity and worth of each person so that each person feels a part of his community and able to contribute fully to the development and well-being of the community and the Province.[9]

Along with this, Ontario's *Occupational Health and Safety Act* embodies a concept of internal responsibility that entails the assumption by employers and workers of a wide range of responsibilities for health and safety in the work setting. Joint health and safety committees are a cornerstone to this internal responsibility system.

This emphasis in Ontario's occupational health and safety legislation on internal responsibility necessitates a sensitivity on the part of employers, workers and the Ministry of Labour to factors that may hinder the effectiveness of joint participation. Such sensitivity is also essential on the part of those accident prevention associations, labour organizations and others whose efforts complement those of these prime participants. As the literacy skills of a work force have implications for the nature of the communications and interactions that occur in the work setting, these skills will influence the nature of joint participation and have implications for ultimate health and safety outcome. Where internal responsibility and joint participation are postulated as significant elements in the achievement of health and safety goals, there is a need to ensure that some groups or cross-sections of workers are not effectively being denied potential health and safety benefits or rights and benefits they should ordinarily be accorded.

Based on these main concerns and consistent with its mandate, the Advisory Council on Occupational Health and Occupational Safety[10] established a task force on literacy and occupational health and safety with terms of reference as follows:

i) To examine the extent of the problems of illiteracy in the work force.
ii) To identify the effects of illiteracy on the effectiveness of occupational health and safety.
iii) To propose recommendations on how problems associated with illiteracy and occupational health and safety can be resolved in the short term and the long term.

The Extent of Illiteracy in the Work Force

1) Defining and Measuring Literacy

To fulfil its terms of reference, the initial problems the task force faced were those of defining 'literacy' and 'illiteracy' and of coming to terms with a means of determining how many people in a given population would be considered literate. In searching for interpretations workable for its purposes, the task force gave consideration to a variety of definitions that have been proffered from time to time by others. 'Literacy' and, therefore, 'illiteracy' are relative to the societal context in which people find themselves, and in view of the relativity and multidimensional aspects of the concept of literacy, the number and variety of definitions that have been used to describe various levels of literacy is not surprising. In order to describe the complexity of both the problems of literacy and semantic debates that ensue, it is useful to scan some aspects of the debate surrounding literacy and literacy definitions.*

It has been said that how literacy is defined '. . . depends upon the point of departure and the intended destination.'[11] The task force, in formulating its own parameters, considered basic occupational health and safety concerns as its primary point of departure. Its intended destination could, perhaps, be best described in terms of the **secondary objectives**[12] as set by council; namely:

- To ensure as far as possible that the policies and programs in occupational health and safety effectively minimize the risks to health and safety in all workplaces in Ontario.
- To ensure as far as possible that knowledge about occupational health and safety is available to management, labour and the public and that it is understood by them.
- To assist in promoting and establishing mechanisms involving management and labour to solve problems in occupational health and safety.
- To ensure as far as possible that there is appropriate manpower training and development for the occupational health and safety field.
- To review periodically the effectiveness of the policies and programs implemented to achieve the above objectives.

It was from the perspective of these objectives and the nature of concerns initially cited by council (i.e. those centring around the educationally and socio-economically disadvantaged and around language and communications barriers to effective labour participation in occupational health and safety matters) that the task force considered a spectrum of literacy definitions that extends over both qualitative and quantitative criteria.

* For further discussion of definitions and of identification and measurement of literacy levels, see Appendix I.

Although there is not complete consensus and few hard data about what constitutes a literacy level and how it should be measured, years of formal schooling attained is the most commonly used criterion to connote literacy level both in Canada and internationally. Of those adults generally considered educationally disadvantaged, two sub-categories can be identified that tend to reflect contemporary views of illiteracy in Canada and, as they coincide with census breakdowns, facilitate data analysis. These categories include: the illiterate, with less than five years of schooling, and the undereducated, with five to eight years of schooling.[1] The Canadian Association for Adult Education and others (including the Ontario Ministry of Education) support the view that contemporary social and economic conditions require at least eight years of schooling for functional literacy.

While years of formal schooling attained is a proxy variable that only estimates literacy levels, those grade levels suggested as representative of illiteracy and functional illiteracy in the Canadian setting are widely accepted. However, acceptance of these grade level criteria in a macro context does not suggest they will be uniformly applicable in specific situations or in all workplaces. One would still expect to find many adults with less than Grade 9 education who have achieved a higher level of literacy and others who have completed more grades of schooling, but are still functionally illiterate for their respective environment. Therefore, while grade level of education achieved provides a general gauge as to the extent of illiteracy and functional illiteracy, it would be simplistic to suggest this approach as the basis for an operative definition.

For its purposes, the task force regarded functional illiteracy as the inability to read at a level at which one is able to adequately comprehend and interpret information basic to one's health and safety in the workplace. It is recognized that what might be considered *basic* can cover a wide spectrum; however, the task force focused on reading ability at the lower end of the spectrum, and the 1978 UNESCO Revised Recommendations concerning the International Standardization of Educational Statistics suggested definitions which, although intended for statistical purposes, are not inconsistent with the task force's perception of illiteracy. These are:

- A person is *illiterate* who cannot with understanding both read and write a short simple statement on his everyday life.
- A person is *functionally illiterate* who cannot engage in all those activities in which literacy is required for effective functioning of his group and community and also for enabling him to continue to use reading, writing and calculation for his own and the community's development.

In a multicultural society as exists in Ontario, language is one of the elements that have to be considered in dealing with literacy. The language element, for those whose first language is other than English, takes on different dimensions,depending upon a number of factors, e.g. whether lack of understanding of English is the literacy barrier or whether illiteracy exists with respect to one's own first language and/or the majority language for that setting.*

* The Advisory Council previously gave consideration to the language issue in the context of a specific request from the Minister of Labour. See Appendix II for further details.

2) Extent of the Literacy Problem**

A report to the Ford Foundation entitled *Adult Illiteracy in the United States*,[14] which attempted to identify and quantify the adult illiterate population in that country, determined that

> Some cities, ... , have placed the number of functional illiterates at half the number of their high school graduates. Thirty states have found it necessary to require that those seeking a high school diploma give evidence of being able to read and write at an eight grade level.[15]

The Industrial Accident Prevention Association of Ontario, while noting a lack of documented proof, submitted the proposition to the task force that functional illiteracy has not been abated and will likely continue to be an ongoing presence in Ontario's work force. The association underscored concern about the magnitude of the problem by reference to some U.S. findings, e.g.:

> In 1975, the then U.S. Office of Education released the results of a four-year study by the University of Texas that indicated that more than 23 million adults in the United States were functionally illiterate.[16] In 1975, the Comptroller General of the United States reported to Congress through the Office of Education, U.S. Department of Health, Education and Welfare, that survey samples indicated the following:
>
> 1. An estimated 86 million adults cannot compute the gasoline consumption rate of a car when given the necessary data.
> 2. An estimated 52 million adults cannot determine the correct amount of change from a purchase when given a cash receipt and the denomination of the bill used to pay for the purchase.
> 3. A projected 39 million adults cannot interpret an earnings statement well enough to find the deduction for social security.[17]

Although the U.S. experience cannot be directly applied to the Canadian scene, sentiments expressed in the report to the Ford Foundation are pertinent here. Describing the United States' situation, the report submitted that 'available statistics, however inaccurate, distorted, culturally biased, and occasionally contradictory they may be – do have a kind of gross truth.'[18] It concluded that:

> The aggregate message of all the statistics is more important than their specific accuracy. A much larger proportion of the U.S. population than had until recently been known or assumed suffers serious disadvantage because of limited educational attainment. In this country persons with limited education are often the same persons who suffer from one or more of the other major social disadvantages – poverty, unemployment, racial or ethnic discrimination, social isolation. Inadequate education will probably be only one manifestation of their deprivation.[19]

** As 1981 census statistics were not available until the task force was near the completion of its work, most census data cited herein are for 1976. Selected tabulations showing 1981 census data follow as an appendix. Where reporting differences affect comparability of 1981 with earlier data, these are noted. See Appendix III, including explanatory notes.

To arrive at quantitative estimates of the extent of illiteracy in the Ontario work force, the task force used the Canadian Association of Adult Education definition categorizing those with less than five years of schooling as illiterate and those with five to eight years of schooling as functionally illiterate. The less than Grade 9 criterion may well underestimate the scope of the problem in that, while some people with less than Grade 9 are undoubtedly fully literate, many who have gone beyond Grade 9 are not.

Table 1. Population 15 Years and Over, not Attending School Full-time[1] Showing Level of Schooling for Canada and Provinces, 1976 Census

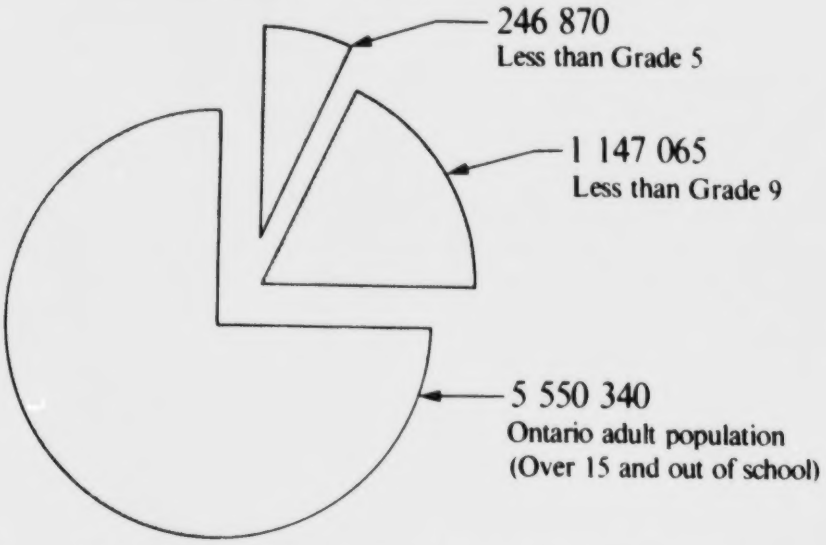
Region	*Population 15 years & over*	*(a) Less than Grade 5*[2]	*(b) Grades 5-8*	*(c) Less than Grade 9*	*(c) as a % of the Canadian Total*
Canada	15,402,025	856,060	3,520,595	4,376,655	100.01
%	100	5.5	22.8	28.4	
Nfld.	338,640	40,205	94,630	134,835	3.08
%	100	11.9	27.9	39.8	
P.E.I.	76,525	3,785	21,185	24,970	0.57
%	100	4.9	27.7	32.6	
N.S.	547,595	23,560	125,850	149,410	3.41
%	100	4.3	23.0	27.3	
N.B.	440,820	34,555	127,310	161,865	3.70
%	100	7.8	28.9	36.7	
Québec	4,191,160	312,785	1,219,725	1,532,510	35.02
%	100	7.5	29.1	36.6	
Ontario	5,550,345	246,865	1,147,070	1,393,935	31.85
%	100	4.4	20.7	25.1	
Man.	692,185	45,475	155,820	201,295	4.60
%	100	6.6	22.5	29.1	
Sask.	618,375	39,715	158,630	198,345	4.53
%	100	6.4	25.7	32.1	
Alta.	1,199,855	46,150	194,445	240,595	5.50
%	100	3.8	16.2	20.0	
B.C.	1,708,300	56,630	269,800	326,430	7.46
%	100	3.3	15.8	19.1	
Yukon	14,065	700	1,775	2,475	0.06
%	100	5.0	12.6	17.6	
N.W.T.	24,170	5,625	4,355	9,980	0.23
%	100	23.33	18.0	41.3	

[1] Includes 'attending part-time'.
[2] Includes 'no schooling' and 'kindergarten'.

SOURCE: Statistics Canada 1976 Census of Canada Catalogue 92-827, Population Demographic Characteristics. Level of Schooling by Age Groups.

As Table 1 above and Figure I following indicate, 25.1 per cent of the 1976 Ontario out-of-school population 15 years of age and over had less than Grade 9 education, while those with less than Grade 5 education made up 4.4 per cent of the Ontario adult population. Using the 'less than Grade 9 education' criterion as a rough yardstick of the extent of functional illiteracy, and irrespective of language considerations, this suggests that, in 1976, approximately 1.4 million Ontario adults (almost 32 per cent of the Canadian population) would have been considered to be lacking functional literacy. Almost a quarter million of these would have been considered illiterate. (Data for 1981 are shown in Appendix III, Table 1.)

Figure I. Distribution of Levels of Education, Ontario Adult Population (over 15 and out of school)



Source: 1976 Census of Canada Population: Demographic characteristics: Level of schooling by age groups. Catalogue 92-827 (Bulletin 2Z18) Table 30-7. As depicted in *Continuing Education The Third System*, a discussion paper published by the Ontario Ministry of Education and Ministry of Colleges and Universities

Table 2. Population by Age, by Level of Education, Ontario, 1976

	000's						
Population 15 yrs. & over not attending school full time	*15 and +*	*15-24*	*25-34*	*35-44*	*45-54*	*55-64*	*65 +*
Total	5,550	973	1,258	955	932	694	738
Less Than Grade 5	247	12	21	35	42	42	96
Grades 5-8	1,147	55	125	190	254	211	312
<Grade 9 as % of Total in age group	25.1	6.8	11.6	23.6	31.8	36.5	55.2

Source: Statistics Canada, 1976 Census of Canada Catalogue #92-827. Demographic Characteristics Level of Schooling by Age Groups.

Of the out-of-school population in Ontario in the age groups 15-24 years and 25-34 years, the 1976 census revealed (see Table 2 above) that approximately 6.8 and 11.6 per cent respectively had less than Grade 9 education. (1981 data by age group are shown in Appendix III, Table 2.) These figures suggest that, over time, a substantial proportion of illiteracy problems will be reduced; but, using this definition, substantial numbers still exist and will continue to exist.

While newcomers to this country tend to have a higher rate of under-education, the 1976 census showed English-speaking people to account for the greatest proportion of the under-educated population in Ontario. However, the highest rate of under-education (i.e. in the sense of formal education) exists among Canada's native peoples, regardless of age group.

Illiteracy *Vis-à-vis* Occupational Health and Safety

The second term of reference of the task force was to identify the effects of illiteracy on the effectiveness of occupational health and safety. In addressing this term, the task force was hindered by a paucity of research. Nevertheless, it explored more fully elements of literacy *vis-à-vis* occupational health and safety, and observations that have been made that suggest both a linkage between educational attainment and health status and an over-representation of the under-educated in industries with higher than average injury frequencies.

1) Disparities in Health

It has been posited that '. . . among socio-economic variables, years of formal schooling completed is probably the most important correlate of good health.'[20] Moreover, the strong association between functional illiteracy and under-education as well as the association between these characteristics and others such as low income, underemployment and employment in hazardous occupations, suggest that those lacking functional literacy are at a relative health and safety disadvantage.

In an effort to review information about differences in health status among citizens in the United Kingdom, and to consider possible causes and their implication for policy, a Research Working Group on Inequalities in Health was set up in 1977 under the chairmanship of Sir Douglas Black.[21]

Using occupational class as an indicator of socio-economic status, the working group found marked differences in mortality rates between the occupational classes for both sexes and at all ages. Despite general improvements in age-standardized death rates since the introduction of the National Health Service in 1947, it had been found that, over the same period of time, there was a lack of improvement, and in some respects deterioration, of the health experience of the semi-skilled and unskilled classes (occupational classes IV and V) relative to the professional class (occupational class I).

Based on review and analysis of considerable background data and literature and international comparisons, the group concluded that there

was not any single and simple explanation for the social inequalities in health. Rather, it was their view that some of the evidence of social inequalities in health derived from specific features of the socio-economic environment, such as work accidents, overcrowding and cigarette smoking, which are strongly class-related in Britain and also have clear causal significance. The importance of health services and preventive services was also indicated; however, it was felt that there was much that could only be understood in terms of the more diffuse consequences of the class structure: poverty, working conditions and deprivation in its various forms. The report went on to comment that:

> Socially and educationally we must encourage a broader understanding of the meaning of health and of the means of its achievement. This will include improvement in incomes as well as better housing and environmental and working conditions.[22]

and further:

> Men engaged in manual occupations routinely confront a much higher degree of risk to health and physical wellbeing in their work task than their non-manual counterparts. These risks are manifold. They may result in direct loss of life either suddenly in the form of accidents or in an attenuated manner through long-term exposure to dust, dirt or poisonous substances in the workplace. The same eventualities may also entail antecedently, physical injury, disability, and chronic illness. The direct risk of physical disability in manual work presents itself in a variety of forms. Amongst these, accident injuries are the most obvious but other forms of physical impairment affecting vision, hearing and breathing are also common accompaniments of productive processes involving manual employment which it must be said, are in no way compensated for by way of financial reward or wages.[23]

It is evident that under-education not only contributes to, but also stems from, the perpetuation of relative socioeconomic disadvantage.

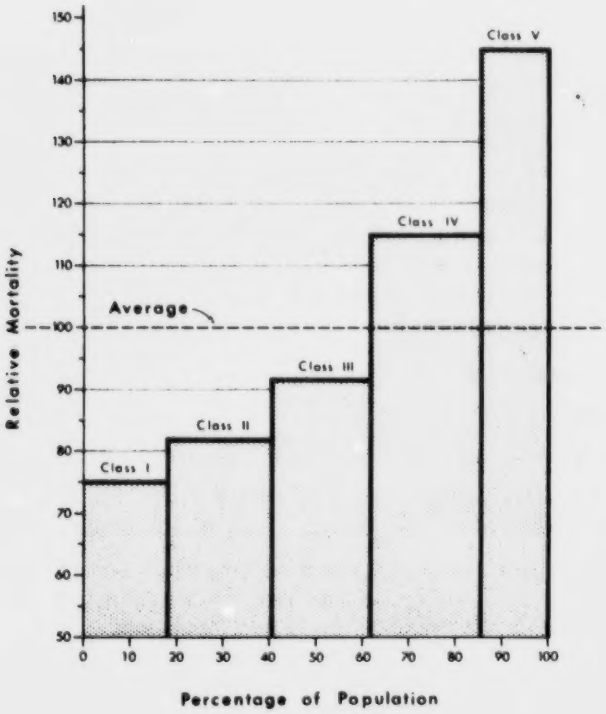
i) Health Disparities in Canada

Canadian data that point similarly to the social dimensions of disparities in the health status of Canadians have increasingly come to the fore. A report by Fraser entitled *Towards the Establishment of Priorities for Research and Action in the Field of Occupational Health and Safety: A Review of Provincial, National and International Data* considered the underlying roles of socio-economic class, attitudes to risk, and lifestyles that interact with the work environment and that confound attempts to distinguish the separate effects of the work environment. Reference was also made in the report to the consistency of mortality data for various classes of industry and occupations amongst the countries for which data have been assembled. It was stressed, however, that these interactive and potentially confounding variables should not be interpreted as meaning that management should be relieved of its responsibility for occupational health and safety.[24]

The Billette and Hill study *Inégalites Sociales de mortalité au Canada* examined the importance of socio-economic disparities of working-age Canadian males.[25] Their findings, as shown in Figure II which follows,[26] support the impression that socio-economic differences in mortality in Canada are probably quite similar to socio-economic differences in mortality seen in other parts of the world.[27]

Figure II

SOCIAL DISPARITIES IN MORTALITY
AMONG MALES 25-64
BY OCCUPATIONAL CLASS, CANADA, 1974

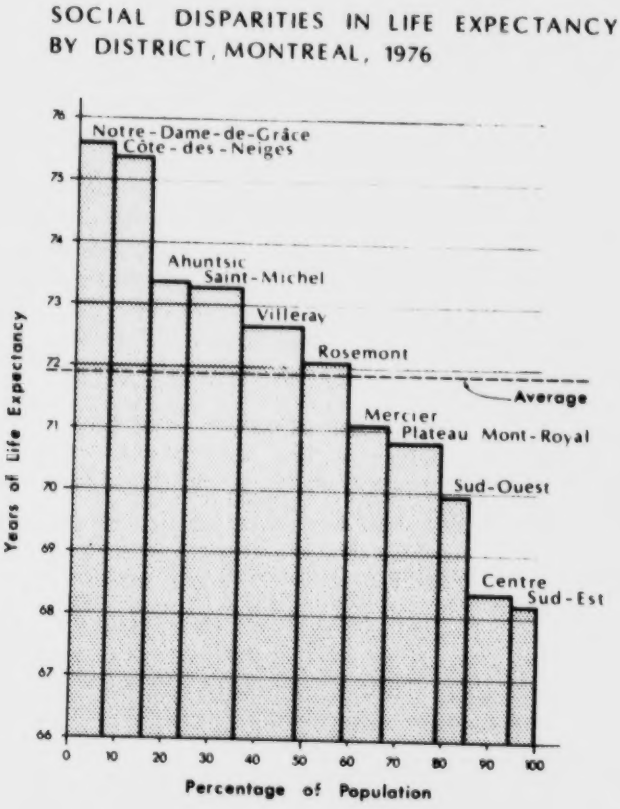


Note: Occupational categories according to Blishen-McRoberts Scale.
I. Professionals and upper levels of management.
II. Technician and middle levels of management.
III. Skilled occupations, including immediate supervisors.
IV. Semi-skilled occupations including immediate supervisors.
V. Unskilled workers, farmers, and labourers.

Source: André Billette and Gerry B. Hill, *Inégalités sociales de la mortalité au Canada* (Ottawa: Department of National Health and Welfare, Long Range Health Planning Branch, 1977) table 6. As depicted in Health Status in Canada 1926. 1976. Wilkins, Russell. Occasional Paper No. 13, Institute for Research on Public Policy, Montreal, May 1980, p.23.

In a paper by Wilkins entitled *L'Espérance de vie per quartier à Montréal, 1976*, which presented an analysis of Montreal data, it was determined that the difference in life expectancy between the 'best' and 'worst' districts in the city of Montreal was approximately seven years.[28] (See Figure III.)

Figure III



Source: Russell Wilkins, L'Esperance de vie per quartier à Montréal, 1976 (Montreal: Institute for Research on Public Policy, 1979). As depicted in *Health Status in Canada, 1926, 1976*. Wilkins, Russell, Occasional Paper No. 13, Institute for Research on Public Policy, Montreal, May 1980, p.24.

In the report *Health Status in Canada, 1926–1976* Wilkins concluded that:

> Social disparities in mortality – whether the indicator of social status is occupational category, educational attainment, or census tract of residence, appear to be as important in Canada as they are in the United States, Great Britain, or France. In societies where equality of opportunity is valued as a basic fundamental right of all persons, such fundamental inequalities in life chances are surely unacceptable.[29]

An observation by Monique Bégin, then Minister of National Health and Welfare, reinforces that view:

> We have to face the fact that although our health insurance programs have made it much easier for poor people to have access to medical care, we cannot break the cycle of poverty and illness through the health care system alone. The poor must have more money. They must be able to live in better housing and eat better food. Their work conditions should be healthier, and they should have better facilities to make the most of their leisure time. *They should enjoy the benefits of an education that will allow them to value their health more and take advantage of preventive measures* . . . (emphasis added).
>
> While it is true that the number of families living below the poverty line has declined during the last ten years, the challenge still remains to narrow the gap between the health status of the higher and lower income groups.[30]

2) Disparities in the Workplace

While the extent and nature of hazards can vary significantly both between and within occupational and industrial classifications, comprehensive data have not generally been available in a form that has permitted direct comparison of labour force/employment data by level of education with that for work injury and ill health experience (based on compensated work injuries). Although the data are not strictly comparable, it can be seen that workers with less than Grade 9 education are overrepresented in a number of 'high risk' industries. (Tables 3.1 and 3.2.)

As data become available that reflect the inclusion of Standard Industrial Classification codes on Workers' Compensation records, it can be expected that more detailed analyses will be possible, as should the development of data more prescriptive as to action warranted with respect to workplace hazards.

Table 3.1. Ontario Labour Force 15 Years and Over, by Industry, Showing Total and Highest Level of Schooling Less Than Grade 9, 1981

Industry	*Total*	*Less than Grade 9*	*% Less than Grade 9*
Agriculture	141,805	39,350	27.7
Forestry	14,420	3,905	27.1
Fishing and Trapping	2,470	715	28.9
Mines (incl. milling), quarries and oilwells)	43,135	8,375	19.4
Manufacturing industries	1,055,565	177,365	16.8
Construction industry	249,590	53,425	21.4
Transportation, communication and other industries	319,105	37,170	11.6
Trade	743,665	66,260	8.9
Finance, insurance, and real estate	260,570	9,790	3.8
Community, business and personal service industries	1,278,145	112,215	8.8
Public administration and defence	311,540	17,695	5.7
All industries	4,420,010	526,270	11.9

Source: Statistics Canada Catalogue #93-966 (Volume 2-Provincial series) Population: Economic Characteristics.

In a personal report by a victim of an industrial accident, it has been suggested that non-English speaking workers and illiterate workers were over-represented among accident victims treated at the then Ontario Workmen's Compensation Board (WCB) Hospital and Rehabilitation Centre in Toronto (1976). While the Workers' Compensation Board does not consistently record information as to language capability and educational level of claimants, periodic language surveys carried out by the board have confirmed a significant over-representation of non-English people among its patient population relative to its claimant population. A survey that had been carried out by the board a number of years ago indicated that there was a predominance of injured workers having less than Grade 9 education among the Metro Toronto WCB vocational rehabilitation caseloads sampled. Over-representation of the category 'English spoken poorly or not at all' was also noted.

Views expressed to the task force from a wide range of sources included much emphasis on the importance of communication to occupational health and safety outcome and, while it was stressed that a *responsible* manager would not rely solely on written materials to protect a worker, the readability level of much print material was a significant concern.

The Ontario Ministries of Education and of Colleges and Universities, in a discussion paper on continuing education, have similarly pointed to the 'severe disadvantage' of the under-educated adult in our society and indicated that the under-educated adult 'may be cut off from basic information in such areas as employment, citizenship and rights, health and community

Table 3.2. Numbers of Fatalities[1] and Compensated Work Injuries/ Frequency Rates per Million Man-hours for Major Industries in Ontario, 1981

Industry[2]	*Fatalities*[3]	*Fatalities Per Million Man-Hours*[3]	*Compensated Work Injuries*	*Compensated Work Injuries Per Million Man-Hours*
	#		#	
Agriculture	11	0.15	2,703	36.08
Forestry	8	0.40	1,663	83.82
Mines, Quarries and Oilwells	19	0.26	4,046	56.09
Manufacturing	49	0.02	73,924	36.88
Construction	36	0.17	14,562	68.68
Transportation, Communication and Utilities	27	0.20	8,403	62.05
Trade	11	0.01	14,452	18.15
Community, Business and Personal Services	13	0.01	12,526	11.91
Public Administration	9	0.12	2,335	31.17
Other	0	0.00	35	28.16
All (Schedule 1[4])	157	0.03	143,139	29.37

[1] Fatalities are those who received their first payment of compensation in 1981 and were dead by year-end 1982. These figures differ from those in the Workers' Compensation Board's record of fatalities (due to different definitions of fatality and different time frames used.)

[2] The WCB rate groups have been allocated to the Statistics Canada's Major Economic Divisions.

[3] Provisional.

[4] Excludes Schedule 2 industries, the employers in which are individually liable to pay compensation and medical aid.

SOURCE: Ministry of Labour (compensated work injuries data).
Canadian Centre for Occupational Health and Safety; from Workers' Compensation Board's Accident Frequency and Cost Rate Records (fatality data).

NOTE: Industry groupings shown in table 3.1 are not directly comparable with those in Table 3.2.

affairs, and further educational opportunity."[31] Activities the discussion paper suggests as those from which many with less than Grade 9 level reading capability are partially or largely precluded include, for example, reading a newspaper; reading instructions on medicine bottles, machinery and appliances; and reading notes that come home from children's schools. As a basis for these claims, the discussion paper includes a graph that depicts (for Alberta) readability level of common print materials (see Appendix IV) demonstrating that much print material in common use is beyond the reach of many with a limited grasp of reading.

In order to assess the reading level of materials relevant to occupational health and safety, the task force undertook to have a variety of print materials analysed, using a mechanical readability formula. In this instance, readability was on the basis of the Fry Readability Formula. A sample is presented

in Appendix V. Using that method, most materials analysed were found to be written above the Grade 10 level.

It should be noted that features inherent in many print materials introduce distortion to readability measurements. (See Appendix VI.) Some pamphlets and posters, for example, repeat numerous polysyllabic words (compensation, employee, employer, occupational . . .) and this repetition tends to over inflate the grade level. On the other hand, expressions such as 'there was a functional component to your continuing disability', 'significant overlay' and 'your condition was asymptomatic', which have appeared in correspondence concerning compensation claims, may well pose problems of interpretation that go beyond mere structural components of the words. At times, efforts to extend readability are apparent, e.g., technical data sheets produced by the Canadian Centre for Occupational Health and Safety include common terms to supplement scientific and technical descriptions, *viz.* vertigo (a disturbance of balance), aspiration (the process by which liquid is 'breathed' into the lungs). Where a pictorial format is used to increase access to a message, 'readability' formulae have no application (e.g., *Industrial Safety*, a pictorial booklet produced by the Industrial Accident Prevention Association, includes limited text in seven languages).

Notwithstanding the limitations of mechanical readability formulae in measuring reading and cognitive skills needed to comprehend the range of print materials available, it is apparent, particularly when the subject matter is unfamiliar, that those with limited reading skills would receive limited benefit from many of the occupational health and safety materials available. This is not to suggest that all instructional or educational materials should be all things to all people. Nevertheless, there is need for sensitivity to the reading and language capabilities of those for whom material is intended and for consideration of alternative means of conveying necessary information.

Concerns about functional illiteracy and occupational health and safety are not strictly limited to matters of the two-way process of oral and written communication. Other situational and behavioural factors having a host of implications also come into play. Practical difficulties in finding and obtaining employment, fear of losing one's job if lack of literacy is discovered, limited job options and lack of confidence can be expected to inhibit the illiterate worker from speaking out and from effectively participating in the resolution of health and safety problems in the workplace. Those who are functionally illiterate tend to be operating from a position of social and economic disadvantage, and the 'stigma' associated with illiteracy may cause the illiterate to hide an inability to read, write or comprehend written material or to fail to seek help. While these factors potentially have implications for occupational health and safety, they also serve to obscure the extent of illiteracy and hinder exploration of its effects.

However, the task force noted wide-ranging concern about the degree of awareness of provisions of the *Occupational Health and Safety Act* existing among those lacking functional literacy, and was convinced that those with limited reading skills would at times be at an added disadvantage in respect of the extent of their recognition of hazards that are not physically apparent as such. It was felt they would be at a disadvantage *vis-à-vis* their

awareness of the *Occupational Health and Safety Act* and rights and responsibilities prescribed under it, their participation, directly or indirectly, in joint health and safety committee work and, more generally, their effective participation in the functioning of the internal responsibility system. The *Occupational Health and Safety Act* provides that a joint health and safety committee (or committee of like nature) be established and maintained at the workplace (e.g., where twenty or more workers are regularly employed at a workplace, and/or where a designated substance regulation applies to a workplace).* Section 8(6) of the Act describes the function and powers of a committee as to:

(a) identify situations that may be a source of danger or hazard to workers;
(b) make recommendations to the constructor or employer and the workers for the improvement of the health and safety of workers;
(c) recommend to the constructor or employer and the workers the establishment, maintenance and monitoring of programs, measures and procedures respecting the health or safety of workers; and
(d) obtain information from the constructor or employer respecting,
    (i) the identification of potential or existing hazards of materials, processes or equipment, and
    (ii) health and safety experience and work practices and standards in similar or other industries of which the constructor or employer has knowledge.

In the case of the designated substance regulations it is provided that the employer, in causing an assessment to be made of worker exposure or likelihood of worker exposure to the substance, shall consult with the joint health and safety committee and that the committee may make recommendations concerning the assessment. A similar provision is stipulated with respect to the development of measures and procedures in a control program for the substance. It is further required that a copy of the control program be given to each member of the joint health and safety committee and that the employer acquaint every worker affected by the control program with its provisions. A copy of the control program is to be made available by the employer in English and in the majority language of the workplace.

The task force believes that clarity of communication is a factor significantly affecting the ability of joint health and safety committees to carry out their function effectively, and that fluency in a written language would aid in this.

In a study prepared by Doern, Prince and McNaughton (1982) entitled *Living with Contradictions: Health and Safety Regulation and Implementation in Ontario* it was stated that:

> . . . all (ministry inspectors and regional managers interviewed) agreed that the job of the inspector in the small unorganized establishment is made particularly difficult by the tenuous position of the employee. It is almost trite to point out that the internal responsibility system cannot operate effectivey where a worker thinks or fears that he jeopardizes his

* In certain circumstances [see section 8(1) of the Act] the Act does not provide for joint health and safety committees. Section 7 of the Act sets out provisions for selection and powers of health and safety representatives at construction projects.

job every time he lodges a complaint. Prohibition or reprisals notwithstanding, an employer can almost always find some excuse to dismiss an 'obstreperous' employee.[32]

Barring an agreement or negotiated arrangement to the contrary, an injured worker may not be assured re-employment and, prohibition of reprisals notwithstanding, the *Workers' Compensation Act* does not provide job protection. As workers with less than Grade 9 education and workers in some ethnic groups are over-represented in a number of the higher risk industries, these workers also disproportionately face the possibility that their 'compensation' for a workplace injury will ultimately include unemployment or underemployment. Although the Workers' Compensation Board has an incentive program to encourage the hiring of rehabilitated workers, in periods of high unemployment and when high unemployment rates affect those industries in which a disproportionately large number of workers lacking in formal education or not fluent in the majority language of the province have tended to be employed, the possibility of unemployment as a penalty for injury will be increased. Perceived or actual vulnerability in terms of one's job, which high unemployment rates will accentuate, may well discourage reporting of accidents, cause workers to be reluctant to make complaints about hazardous conditions and impair the effectiveness of joint health and safety committees.

The Advisory Council on Occupational Health and Occupational Safety, through the work of its Task Force on the Implementation of the *Occupational Health and Safety Act*, identified a need to examine the functioning of joint health and safety committees. The Ministry of Labour also identified this as an area warranting more intensive study and, in accordance with this mutual concern, it was agreed that a survey of joint health and safety committees in Ontario would be carried out under the auspices of the advisory council. The Task Force on Literacy requested that implications of language and literacy for the functioning of joint health and safety committees be included among issues addressed by the survey. Although there are many factors that complicate the study of this issue, it is hoped that the survey will shed light on problems associated with illiteracy in the workplace and means of resolving them.

Quantitative evidence regarding the incidence of accidents in which illiteracy has been a direct cause is not available.[33] Indeed, opinions expressed to the task force from a wide range of sources saw illiteracy as a variable rather than a causal factor. It was generally felt that cause lay rather with the presence of hazards in the workplace and/or insufficient or inappropriate instruction or training. Several incidents described to the task force, which are noted below, demonstrated the compounding of risk that can occur where the treatment prescribed for a hazardous condition is safety instruction and such instruction is inadequate.

- A worker who was unable to read was newly recruited to a construction site and was asked to obtain boots for the worksite. The boots purchased outwardly resembled those worn by other workers but, having no steel plate insert, subsequently played a part in an injury to the worker's foot.
- A worker was injured when handling chemicals that had safety instructions on the label, which he was unable to read.

- A pictorial instruction material demonstrating 'how not to' carry out a task was interpreted as a 'how to' instruction and the result was an increase in accidents.

These examples reinforced concerns about the vulnerability of workers to injury where there are workplace hazards and inadequate consideration has been given to the elimination of the hazard or to the adequacy or effectiveness of communication.

A small study, carried out on behalf of the task force, of literacy students involved in an adult basic education (ABE) program in London, Ontario found that

- almost all participants had the need to read material relating to occupational health and safety and that all had experienced some difficulty in doing so;
- most ignored instructions they could not read;
- only about one-half had been provided with oral explanations of jobs.

These findings, though scanty, attest to problems facing workers who lack reading skills and provide examples of circumstances in which there were inadequate measures taken in the workplace to overcome or accommodate for these problems.

Responses and Developments

It is not intended to attempt to summarize here the range of programs and activities and individual and group initiatives in the area of literacy and language training.* In the course of the deliberations of the task force, however, a number of activities that came to the notice of the task force have demonstrated significant adaptability to the nature of the worker and the work environment. Directly or indirectly, they address the twofold nature of the problem, i.e. improving the literacy and communication skills of the worker, and safety in the workplace, and, hence, may warrant expansion or emulation. Several such activities are referred to below.

Notable among these was a project undertaken by an employer, Levi Strauss, together with CORE (Community Outreach in Education), a charitable foundation operating in the North York Board of Education, and the then Ontario Ministry of Culture and Recreation. This project involved the development of a custom tailored English for the workplace/job training program. The degree of success achieved in improving worker safety was attributed in large part to the extent of management/worker/union involvement and co-operation in designing a program that suited the needs and characteristics of the workers and the nature of the work. Benefits were seen

* For further descriptions of these and other programs and activities in the area of literacy and second language training, see, for example:
- *Adult Literacy in Canada – a Challenge* – Occasional Paper 42, Canadian Commission for UNESCO, (Prepared by Audrey M. Thomas with an Introduction by John C. Cairns) Summer 1983.
- *TESL Talk*, Vol. 13, No. 4, Fall 1982 (English in the Workplace), Ministry of Citizenship and Culture.
- *Adult Basic Literacy: A Directory of Ontario Programs*, by Ethel Anderson, published by the Ministry of Education, 1983.
- Refer also to Ministry of Citizenship and Culture re that ministry's recent activities, workplace initiatives and listing of holdings on the subject of workplace ESL classes.

to include improved on-floor communications resulting in faster resolution of machine problems and improved training results. Supervisors found that the employees were advising them of problems that otherwise would not have been understood or even known about. Due to the success of the project, steps were subsequently taken by Levi Strauss toward implementation of the program in their other North American sewing operations.

Frontier College has long been recognized as a pioneer in the field of adult education and literacy training in Canada. Through need-sensitive programs involving labourer-teachers and community educators, Frontier College addresses literacy, language and related needs. Other program developments have included the preparation of self-help booklets for tutors and students and the publication of an organizer's manual and a tutor's handbook. A small literacy resource centre has also been established at the college's small central office in Toronto.

The issue of literacy has been of long standing concern to the labour movement and local labour organizations, and locals of specific unions have offered basic education programs in the workplace and in union halls.

Among other delivery agents for adult basic literacy and/or English as a second language training, a few are noted here. Many community colleges in Ontario have played an active role. In response to the phasing out of Canada Employment and Immigration Commission (CEIC) sponsored literacy programs, many adult basic literacy personnel in community colleges have organized literacy outreach projects either under the auspices of the college or on their own initiative. Certain Ontario school boards offer evening and, in a few cases, day courses providing academic upgrading. Other school boards are co-operating with community-based literacy programs.

Literacy councils, with volunteers utilizing the Laubach tutoring method, provide literacy training on a 'one-to-one' basis. Other literacy councils and programs that make use of a variety of literacy training methods are sponsored by public libraries, voluntary organizations and private agencies.

The Movement for Canadian Literacy (MCL), which originated through work undertaken in Canada by World Literacy of Canada, has functioned since 1978 as a voluntary membership network and has a membership that covers all provinces and territories. A number of local and provincial groups of the MCL have evolved that provide a common voice on literacy issues and provide opportunities for regional networking, professional development and local tutor-training events. World Literacy of Canada and the Movement for Canadian Literacy have done much to attempt to bring about public awareness of the extent of illiteracy in Canada.

A number of commissions and task forces have drawn attention to adult functional illiteracy and have made recommendations addressing problems. Among these working groups have been the Commission of Inquiry on Educational Leave and Productivity (Adams report), the report of the Parliamentary Task Force on Employment Opportunities for the 80s (Allmand task force) and the report of the Commission d'étude sur la formation des adultes (Jean commission on adult education in Québec). All these working groups lamented the problem of adult functional illiteracy and the fact that it had not been adequately addressed.

- The Commission of Inquiry on Educational Leave and Productivity argued that a national campaign should be undertaken against adult illiteracy and that educational leave, particularly of the day release type, should be made more widely available to under-educated adults so that they might more readily gain access to educational opportunity.
- The Commission d'étude sur la formation des adultes in Québec argued for 'a comprehensive adult education policy', which 'must first tackle illiteracy as the most pressing priority.'
- The Task Force on Employment Opportunities for the 80s concluded that 'Functional illiteracy is a national problem' and that 'past efforts for dealing with this problem have not been successful'. Its major recommendation in this area was that Canada should adopt a 10-year National Right-to-Read Program.

The (Dodge) Task Force on Labour Market Development reinforced concern about individuals lacking a high school education and noted that:

> A small subset of young people, primarily those who do not complete high school, experience particular labour market difficulties which continue to warrant special attention. Indeed, the plight of these individuals may well worsen in years to come as the average education level of their peers increases and they become increasingly disadvantaged in the job market.[34]

More recently, the 1983 report to the Minister of Employment and Immigration Canada by the Skill Development Leave Task Force (*Learning a Living in Canada*) pointed to the inequality of access for individual Canadians to learning services and the resultant inequality of access to the labour market.

A conference on Literacy and Un(employment) sponsored by the Social Planning Council of Metropolitan Toronto and World Literacy of Canada was held in Toronto in February 1983. There was presented at that conference a 'Statement on Literacy' calling for 'immediate action from the Provincial and Federal Governments to improve policies, funding and public awareness, to begin to combat the serious problem of functional illiteracy in Canada.'

The Ontario Education Communication Authority (OECA) and its educational television service, TV Ontario, have made a continuing commitment to adult literacy. In the fall of 1983 TV Ontario broadcast a five-part program on adult literacy designed for people wishing to set up literacy programs.

The Ontario Ministries of Education, and Colleges and Universities, in the discussion paper entitled *Continuing Education: The Third System*, noted the extent of under-education in Ontario and problems for the under-educated, and cited under-education as the fundamental barrier to educational opportunity in the 20th century. A subsequent statement issued March 1983 as the first of a series of statements adopted by the Ministries of Education, and Colleges and Universities, and titled *Continuing Education in the Schools, Colleges, and Universities of Ontario*, was said to represent the product of consultation following the release of the discussion paper. Referring to the publicly supported system, the statement set among its goals: to ensure

that appropriate support, co-ordination and direction are provided to meet the basic education in literacy and numeracy needs of adults through the part-time or short-term programs of school boards, colleges or universities as appropriate. Among the general objectives for continuing education, it included: 'To ensure the delivery of adult basic literacy programs through school boards in consultation and co-operation with colleges of applied arts and technology and with interested community groups.' Adult Basic Literacy (ABL) was defined in the statement as 'those Adult Basic Education courses and programs designed to develop the knowledge and skills of literacy and numeracy necessary to undertake education at a secondary school or academic upgrading of equivalent difficulty at a college of applied arts and technology.'

There are indications of increased emphasis on safety education in the public school system. For example, a Tri-Ministerial Advisory Committee on Occupational Health and Safety with representation from the Ministries of Health, Colleges and Universities, and Labour was formed in December 1980 with a mandate to review submissions with respect to the health and safety content of proposed post-secondary school programs. Further, the Ministry of Education has appointed a safety officer to co-ordinate activities related to safety education.

The Ontario Council of Safety Associations has identified the disproportionately high incidence of work-related injuries incurred by employees in the 15 to 24-year age group in their first few months on the job as a matter of concern pointing to the need to increase safety awareness among young people prior to entry into the work force. A research study was prepared for the Council of Safety Associations by the Social Program Evaluation Group, Queen's University, to provide the Council of Safety Associations with background information to enable it to make decisions about the most appropriate initiatives to be taken to contribute to improving the quality of occupational health and safety education in the pre-employment period. The study concluded that in order to increase the receptivity of educators to learning resources, it is first necessary to achieve a greater awareness among those in positions of influence in the educational system of the need for improved occupational health and safety education. The first three recommendations (as directed at the Council of Safety Associations) enumerated in the study and which dealt with this issue, were as follows:

- Develop procedures for improving the quality of statistics on accident injuries by adding detail about the victims' educational backgrounds and training experiences and the circumstances contributing to the accidents, and by reporting data within more realistic age groupings (16-17, 18-20, 21-24). Identifying 'high risk of injury groups' would provide a better basis for materials development and dissemination.
- Design materials incorporating accurate statistics and specific case studies in order to increase the awareness of educators regarding the importance of Occupational Health and Safety Education. Disseminate this information to Safety Officers in colleges and universities, to teachers' federation officials and to Board of Education professionals for use in workshops designed to communicate the need for the inclusion of increased Occupational Health and Safety Education content into curricula.
- Establish contacts with health educators, both inside the Ministry of Education and in other positions (e.g., school boards, universities), for the

purpose of affirming the importance of including Occupational Health and Safety issues within Grades 9 and 10 Health curricula. This would be done by (1) encouraging participation of Council (of Safety Association) members in curricular activities at the ministry level; (2) the Council recommending that the Tri-Ministerial Committee be augmented to include a representative from the Ministry of Education; and (3) inviting this Ministry of Education representative on the Tri-Ministerial Committee to participate in Council activities.[35]

Although it is early to assess what their impact will be, several other developments potentially affecting occupational health and safety education include:

- the federal/provincial Workplace Hazardous Materials Information System (WHMIS) project – the goal of which is to establish a national information system to deal with labels for containers of hazardous materials, material safety data sheets and worker training.
- the formation of an Occupational Health and Safety Education Authority with representation from management and labour, replacing the Safety Education Division of the Workers' Compensation Board.
- a study being prepared by the Ministry of Labour of occupational health and safety training programs in the province.

Conclusions and Recommendations

The problems associated with literacy and occupational health and safety in the workplace are diverse. Foremost among them is the existence of health and safety hazards in the workplace – hazards that endanger both literate and illiterate workers and from which employers are not immune.

Implementation of Ontario's occupational health and safety legislation is based on the philosophy of internal responsibility. If the internal responsibility system is to be a cornerstone in the approach to resolving occupational health and safety problems in Ontario workplaces, the Minister of Labour has a responsibility for ensuring that conditions that mitigate against its success are overcome or that the need for this is remedied by other means.

In view of the breadth of responsibility for reducing workplace hazards and because of the broad health and safety implications of functional illiteracy (including the part functional illiteracy plays in its own perpetuation), resolution of problems of functional illiteracy must be recognized also as a social responsibility. As Cairns and Kirkwood have observed:

> It has almost become axiomatic that individuals cannot claim their rights as Canadian citizens unless they are sufficiently literate to read and understand critical materials with which they are confronted. Because we want citizens participating in all aspects of government and society, literacy has become a valued commodity in our society.[36]

Literacy must be looked on as a democratic right, and because literacy continues to elude many in spite of the provision of a system of public compulsory education, more extensive and concerted effort is necessary to provide the means by which literacy training is made more accessible.

The manner in which society and the work environment have been structured has long engendered barriers to the integration of many into society (for example, the physically and mentally disabled). Steps are increasingly being taken to remedy situations that limit the participation of the disadvantaged (in some cases, it can be argued, by their lack of concurrence with some perceived norm), and this is accepted as a matter of public policy. By the same token there are many, and will continue to be many, who do not achieve functional literacy, and with the pace of changing technology, it is likely that those with minimal levels of education will find it increasingly difficult to adapt. Therefore, it is important that our living and working conditions take such differences into consideration in ways that do not deprive these people of their rights as citizens.

It is essential, moreover, to ensure that an 'internal responsibility' orientation to occupational health and safety not lead to complacency. In some workplaces the *Occupational Health and Safety Act* does not provide for joint health and safety committees. Even where committees are mandatory under the Act, factors such as lack of understanding of hazards, vulnerability of workers, difficulties facing employers and/or lack of resources available to joint health and safety committees, may impede the achievement of reasonable occupational health and safety levels. Where such is the case, a variety of measures may be necessary either to overcome or to compensate for such impediments. The approach overall would ideally result in an effective and efficient mix of measures by which occupational health and safety may be improved.

The findings of the task force led members to agree that, if we are to hope to alleviate occupational health and safety problems associated with illiteracy, elimination or reduction of hazards in the workplace is necessary. Reduction of illiteracy provides a key to more effective monitoring of hazards and more extensive participation in reducing hazards in the workplace. Some of the means of dealing with these matters reasonably fall within the sphere of activities of the Ministry of Labour or the ministry in co-operation or consultation with other ministries and/or organizations. Other means that are more appropriately outside the direct sphere of the Ministry of Labour, may well warrant the Minister of Labour's support and encouragement.

TASK FORCE ON LITERACY RECOMMENDATION #1
(ACOHOS RECOMMENDATION 84-19)

> that the Minister of Labour, as a matter of policy, support and encourage appropriate measures and programs to ameliorate problems of functional illiteracy.

The *Occupational Health and Safety Act* and the designated substance regulations promulgated thereunder describe participative roles for joint health and safety committees in the identification of hazards, in the development of workplace assessments and control programs, and in recommending improvements for the health and safety of workers.

There is a literacy problem when the ability of workers at all levels to comprehend health and safety related information does not meet the degree necessary or desirable to protect the workers' health and safety. The literacy

situation may vary in different workplaces according to the range of print materials provided, the workers' ability to comprehend the subject matter in print materials and the reliance on print materials *vis-à-vis* other means of communication.

Special attention should be paid to workers who are new to a workplace.

A clear function of the health and safety committee must be to consider whether all workers (at all levels) are aware of the rights and responsibilities of workers and employers under the *Occupational Health and Safety Act* and whether workers are made aware of hazards in the workplace and of safe work practices. In considering these matters, the committee should be cognizant of the fact that traditional methods of communication may be inadequate in many instances.

TASK FORCE ON LITERACY RECOMMENDATION #2
(ACOHOS RECOMMENDATION 84-20)

that the Minister of Labour take the necessary steps to ensure, and to ensure it is made clearly known, that it is part of the mandate of joint health and safety committees to consider the literacy situation in the workplace. Where health and safety committees ascertain that there is a literacy problem,

a) they should be encouraged to take appropriate action to overcome the problem including the establishment of literacy upgrading programs;
b) public funds should be made available to support programs that are designed to overcome functional illiteracy, and are initiated by health and safety committees; and
c) health and safety committees should be encouraged to work closely with agencies that have expertise in adult basic education (ABE) to design programs appropriate to their situation.

In order to overcome some of the problems of communicating information to workers, where appropriate, audio/visual aids or other methods should be used to facilitate the effective transfer of information with respect to hazards and hazardous conditions in the workplace and the rights and responsibilities of workers and employers. Efforts should be made to simplify print materials so that they can be understood by those for whom they are intended and supplement technical, legal and complex terms with simpler and more understandable wording.

TASK FORCE ON LITERACY RECOMMENDATION #3
(ACOHOS RECOMMENDATION 84-21)

that the Minister of Labour encourage, where appropriate, the use and development of audio/visual aids and/or other appropriate methods to facilitate the effective transfer of information with respect to workplace hazards and the rights and responsibilities of workers and employers under the *Occupational Health and Safety Act*.

TASK FORCE ON LITERACY RECOMMENDATION #4
(ACOHOS RECOMMENDATION 84-22)

> that, where existing or new print materials are used to convey occupational health and safety related information to workers and employers, the Minister of Labour take the steps necessary to have the ministry use and encourage the use of materials that are readily understandable by the people for whom they are intended.

In order that workers, employers, and joint health and safety committees (as well as labour organizations, safety associations, and others concerned with the health and safety of workers) may be adequately informed about existing programs and arrangements available for adult basic literacy training and second language (*viz.* English, French) training, greater accessibility of information about existing programs is necessary.

TASK FORCE ON LITERACY RECOMMENDATION #5
(ACOHOS RECOMMENDATION 84-23)

> that the Minister of Labour consult with appropriate ministries and organizations involved in the delivery of adult basic literacy (ABL) and second language training (ESL/FSL) in order to ensure greater accessibility of information on the availability of resources and options.

In order that the Ministry of Labour is able to fulfil its responsibilities for occupational health and safety, provision should be made in the ministry to ensure that workers and employers may be appropriately advised concerning the availability of adult basic literacy and second language training resources and options.

TASK FORCE RECOMMENDATION #6
(ACOHOS RECOMMENDATION 84-24)

> that the Minister of Labour take the necessary steps to ensure that appropriate provision is made in the ministry to ensure that workers and employers may be appropriately advised concerning the availability of resources and options for adult basic literacy and second language training.

The elimination of hazards in the workplace is, of course, a more effective means of reducing occupational injury and ill health than is the communication of information about the hazard and how to avoid risk. In order to effectively work toward the elimination of hazards, it is desirable that workers and members of joint health and safety committees have adequate literacy to participate effectively in the activities of joint health and safety committees.

The Ministries of Education, and Colleges and Universities, in a working paper on responses to the discussion paper *Continuing Education: The Third System* have identified adult basic education as a priority area. With a discontinuation of funding to community colleges for this area, school

boards, with Ministry of Education funding, are to become prime delivery agents for literacy programs. As well, the Ministry of Education will provide grants to school boards to offset the costs of programs developed co-operatively with community groups.

In view of the inverse relationship between under-education and occupational health and safety generally and the dual need of many workers for both basic literacy training and education in occupational health and safety matters, increased attention should be paid to the integration of adult basic literacy training and occupational health and safety training.

TASK FORCE ON LITERACY RECOMMENDATION #7
(ACOHOS RECOMMENDATION 84-25)

> that the Minister of Labour urge the co-operation of the Ministry of Education and other ministries and/or other educational institutions and agencies to achieve an integration of occupational health and safety matters into adult basic literacy curricula and in developing such curricula, the Ministry of Education should be advised to consult with agencies already having programs in occupational health and safety, e.g. labour organizations and safety associations.

A number of commissions and task forces have, in recent years, urged the undertaking of a national literacy campaign. In order to broadly demonstrate the basic right of all citizens to literacy, to achieve a greater impact in reducing the extent of functional illiteracy in Canada, and in recognition of the Ministry of Labour's occupational health and safety responsibilities, the task force believes that the Minister of Labour should indicate support of a broad-based 'right to read' campaign. Ontario public policy should similarly reflect support of such a campaign.

TASK FORCE ON LITERACY RECOMMENDATION #8
(ACOHOS RECOMMENDATION 84-26)

> that the Minister of Labour indicate support for a broad-based 'right to read' campaign to overcome problems of functional illiteracy and urge other elected representatives to join in this support.

The task force believes that a multiplicity of formats and approaches for addressing illiteracy are appropriate and desirable. Volunteers play an important part in the provision of literacy programs, and a sharing of information and resources with the voluntary sector should be encouraged.

The task force considers that the Ministry of Labour has a responsibility for ensuring that there is increased funding to encourage and assist workplace/time based literacy and second language upgrading programs as well as those carried out outside the workplace and that have significant occupational health and safety thrust.

With high unemployment and with a lower rate of labour force participation among the under-educated, it is essential not to exclude those not presently active in the work force from the thrust of adult basic literacy and second

language/occupational health and safety training. Functional illiteracy is higher among the lower income groups and those on welfare, and steps should be taken to ensure that personal financial burden does not unduly deter those who lack basic literacy skills from obtaining upgrading. Family responsibilities (which can include responsibilities for children as well as aged or infirmed family members) may well pose difficulties for either parent in his or her capacity to address literacy and/or second language upgrading. For sole support families, financial strains and family responsibilities may pose inordinate obstacles to obtaining literacy upgrading. These factors should be strongly considered in devising increased financial support and support services (e.g., daycare). Efforts should be made to ensure that those lacking basic literacy skills are not precluded from other skill development training, thus perpetuating the illiteracy/deprivation trap.

The task force believes that steps should be taken to reduce obstacles impeding individuals from taking adult basic literacy and second language training. In considering appropriate courses of action in this regard, particular notice should be taken of recommendations put forth in the reports of the Adams commission,the Allmand task force and the report to the Minister of Employment and Immigration Canada (*Learning a Living in Canada*) by the Skill Development Leave Task Force.

TASK FORCE ON LITERACY RECOMMENDATION #9
(ACOHOS RECOMMENDATION 84-27)

> that the Minister of Labour take steps to foster the development of a comprehensive scheme that would reduce obstacles that impede individuals from undertaking adult basic literacy and second language upgrading.

TASK FORCE ON LITERACY RECOMMENDATION #10
(ACOHOS RECOMMENDATION 84-28)

> that the Minister of Labour initiate a meeting or meetings of appropriate ministries, agencies, and management and worker representatives concerned about occupational health and safety, literacy and second language instruction (to include as a minimum the Ministries of Labour, Education, Community and Social Services and Citizenship and Culture) to discuss, with a view to increasing, provision of more flexible programs in basic literacy and second language instruction suited to the needs of adults. It is noted that the volunteer sector is important in this program area, and provision should be made to encourage sharing of information and resources.

Hazards in the workplace are a product of many dimensions of our society. The public education system has an important role to play in redirecting these influences if workplace design, and equipment and process design are to eliminate hazards at the source. Public education also has an important part in ensuring that youth entering the labour force (for whom accident rates are the highest) are to enter the labour force better protected and aware of their rights and responsibilities as workers and employers. A number of new initiatives are already being taken in relation to education.

For example, the Tri-Ministerial Advisory Committee on Occupational Health and Safety with representation from the Ministries of Health, Colleges and Universities, and Labour has been addressing some of these issues. Furthermore, the Ministry of Education has a safety officer whose function is to co-ordinate activities related to safety education. A number of safety associations have programs and materials used in elementary schools as well as at other levels including community colleges. An Occupational Health and Safety Education Authority reporting to the Workers' Compensation Board has been established, and, currently, the Ministry of Labour is preparing a survey of occupational health and safety training in the province, including programs in school systems.

Much work needs to be done in researching and gaining understanding of problems associated with illiteracy and occupational health and safety and in coming to terms with the means of resolving problems. The work of the task force was hindered by the absence of systematic investigation in this area, the anecdotal nature of the evidence and the sensitivity of the issues involved. It is hoped that the survey of joint health and safety comittees in Ontario, which is being undertaken by the Advisory Council on Occupational Health and Occupational Safety,will improve insight into these areas.

TASK FORCE ON LITERACY RECOMMENDATION #11
(ACOHOS RECOMMENDATION 84-29)

> that the Minister of Labour initiate and support further research into matters related to literacy and occupational health and safety and bring the need for further research to the attention of other ministries.

It is recognized that joint health and safety committees are not mandatory in all workplaces and, in any case, generally are not mandatory in workplaces with fewer than 20 employees. Safety associations, labour organizations, the Workers' Compensation Board and others, including, for example, chambers of commerce and small business organizations, should assume increased responsibilities in attending to the literacy/occupational health and safety needs of all workplaces.

TASK FORCE ON LITERACY RECOMMENDATION #12
(ACOHOS RECOMMENDATION 84-30)

> that the Minister of Labour take steps to encourage safety associations, labour organizations, the Workers' Compensation Board and others, including chambers of commerce and small business organizations, to assume increased activity in attending to literacy/occupational health and safety needs.

Efforts to overcome literacy and occupational health and safety related problems involve both short- and long-term initiatives. The task force is of the view that progress with respect to such efforts should be monitored regularly. In keeping with this, the task force recommends the following:

that the Minister of Labour take steps to report in the legislature on an annual basis, setting out: what is being done, what evidence there is of success or failure, and what the intentions are for the year ahead with respect to literacy and occupational health and safety.

References

1 *Adult Illiteracy in Canada – A Challenge*. Canadian Commission for UNESCO. Occasional Paper 42, summer 1983, p.1. (Introduction by Cairns, John C.).
2 *Education and Working Canadians*. Report of the Commission of Inquiry on Educational Leave and Productivity (Adams Report). June 1979, p.117.
3 Dickenson, Gary. Adult Illiteracy in Canada and British Columbia. *Pacific Association for Continuing Education Newsletter*; vol. 9; no. 1; 1979, p.23.
4 Adams Report; 2 *op.cit.*
5 *Canadian Fact Book on Poverty*, 1979, Canadian Council on Social Development.
6 Thomas, A.M. *Adult Basic Education and Literacy Activities in Canada 1975-76*. Toronto: World Literacy of Canada, 1976.
7 *Ibid.*
8 Grossman, Michael. The Correlation Between Health and Schooling. *Demographic Behavior of The Household*. New York: National Bureau of Economic Research, 1976, p.147.
9 Ontario *Human Rights Code*, 1981. Preamble.
10 For complete statement of Council's objectives, see 'Mandate and Objectives'. In: *Advisory Council on Occupational Health and Occupational Safety, Annual Report(s)* to date (inside front cover).
11 Danzat, Sam V. and Danzat, Joanne. Literacy: In Quest of a Definition. *Convergence*; vol. X; no. 1; 1977, p.40.
12 *10 op.cit.*
13 Dickenson, Gary. Educationally Disadvantaged Adults in Canada. *Adult Literacy and Basic Education*. Summer 1978.
14 Hunter, Carman St. John and Harman, David. *Adult Illiteracy in the United States*. New York: McGraw Hill Book Company, 1979.
15 *Ibid.*
16 University of Texas, *Adult Functional Competency: A Summary*. Austin, Texas: The University of Austin, March 1975. '23 Million in U.S. Found Illiterate', *The New York Times*, October 30, 1975, p.42.
17 Heath, Earl D. *A Report on Occupational Health and Safety Training in Six Industrialized Western Countries*. Published by U.S. Department of Labor.
18 *14 op.cit.*
19 *Ibid.*
20 *8 op.cit.*
21 *Inequalities in Health*. Report of a Research Working Group, DH SS. London, England: Secretary of State for Social Services, August 1980.
22 *Ibid.*
23 *Ibid.* pp. 187, 189: 6.75.

24 Fraser, R.D. Towards the Establishment of Priorities for Research and Action in the Field of Occupational Health and Safety: A Review of Provincial, National and International Data. *Advisory Council on Occupational Health and Occupational Safety, Third Annual Report, April 1, 1980 to March 31, 1981.*

25 Billette, André and Hill, Gerry B. Inégalites Sociales de mortalité au Canada. Ottawa: Department of National Health and Welfare, Long-Range Planning Branch 1977 – as reported in *Health Status in Canada 1926.1976* by Wilkins, Russell, in Occasional Paper No. 13, Institute for Research on Public Policy, May 1980.

26 *Ibid.*, p.13.

27 See *Health Status in Canada 1926.1976*, Wilkins, Russell,Occasional Paper No. 13, Institute for Research on Public Policy, May 1980.

28 Wilkins, Russell. *Health Status in Canada 1926.1976*. Occasional Paper No. 13, Institute for Research on Public Policy, May 1980, p.22.

29 *Ibid.*, p.13.

30 Begin, Monique. Health: An Integral Part of Human Development. *Canadian Journal of Public Health 69*. July-August 1978, pp. 273-74, as reported in 28 *op.cit.*

31 *Continuing Education: The Third System*. A discussion paper published by The Ontario Ministry of Education and Ministry of Colleges and Universities, p.32.

32 Doern, Prince and McNaughton. *Living with Contradictions: Health and Safety Regulation and Implementation in Ontario*. Study No. 5 prepared for the Royal Commission on Matters of Health and Safety Arising From the Use of Asbestos in Ontario, June 1982.

33 For detailed discussion/examination of 'accident proneness' theory see, for example:
Sass, Robert and Butler, Richard. *The Accident Proneness Theory: A Dead Horse That Won't Lie Down*. Saskatchewan Department of Labour, Occupational Health and Safety Branch, 1978.
Lee, Gloria and Wrench, John, "Accident-Prone Immigrants": An Assumption Challenged. *Sociology*; vol. 14(4), November 1980.

34 *Labour Market Development in the 1980s*. Report of the Task Force on Labour Market Development. Employment and Immigration Canada, July 1981, p.59.

35 *Improving Occupational Health and Safety Education in Ontario*, a Research Study Proposed for The Council of Safety Associations, Ontario. Social Program Evaluation Group, Queen's University, Kingston, March 23, 1983; p.79.

36 Cairns, J. and Kirkwood, K.J. Defining Literacy in Canada. *Values, Lifelong Education and an Ageing Canadian Population*. London: The University of Western Ontario, 1984, p.94.

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Mr. H. Sanders	Vocational Rehabilitation Services, Workers' Compensation Board.
Mr. J. Thakur	Medical Services, Workers' Compensation Board.
Mr. L. Sylvester Mr. G. J. Samson Mr. A. Sislian	Construction Safety Association of Ontario.
Mr. J. Stefanini Mr. R. Ford Mr. E. Thornton	Labourers' International Union of North America.
Mr. G. Swartz	Consultant.
Dr. K. Kirkwood	College of Family Physicians of Canada.
Ms. E. Steinhauer	Community Outreach in Education Foundation.
Ms. J. Bell	Consultant.
Mr. M. Small Ms. W. Richardson	Levi Strauss Canada.
Mr. N. McCombie	Injured Workers' Consultants.
Mr. Rafael Ramirez	Action Learning Resources Group, York University.

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* formerly the Ministry of Culture and Recreation.

APPENDIX I

Re: Defining and Measuring Literacy

Literacy definitions range over both qualitative and quantitative aspects, and as literacy is relative to the societal context in which people find themselves, it is an evolving concept with the requirements for literacy changing over time. Following is some further discussion of definitions and the debate surrounding identification and measurement of literacy levels.

Sticht defines functional literacy in a job-related context as the 'possession of those literacy skills needed to successfully perform some reading task imposed by an external agent between the reader and a goal the reader wishes to obtain.'[1] Hunter and Harman have defined functional literacy as 'the possession of skills perceived as necessary by particular persons and groups to fulfil their own self-determined objectives as family and community members, citizens, consumers, job-holders, and members of social, religious or other associations of their choosing.'[2]

It can be seen that the Hunter/Harman view of the concept of literacy involves self-perception of objectives and goals. Sticht's definition, which refers to 'reading tasks imposed by an external agent', links this to the reader's goal. Undoubtedly, self-perceived and self-determined objectives are among prime elements that determine one's perception of literacy needs, level of literacy sought and extent of literacy attainment. However, it is important to recognize the self-limiting aspect of these definitions of functional literacy, i.e. some of the same factors that determine the individual's literacy needs and the levels of literacy sought and attained also influence the individual's expectations and frame of reference and, in turn, one's original objectives, goals, and perceptions of need. It can also be assumed that 'invisible' hazards (e.g. asbestos) may not invoke the appropriate perception of need for caution or sense of literacy need on the part of an individual at risk.

Other definitions attempt to identify a literacy measuring device, one that will facilitate obtaining literacy/ illiteracy statistics. The 1978 UNESCO Revised Recommendations concerning the International Standardization of Educational Statistics suggested definitions for statistical purposes:

- A person is *literate* who can with understanding both read and write a short simple statement on his everyday life.
- A person is *functionally literate* who can engage in all those activities in which literacy is required for effective functioning of his group and community and also for enabling him to continue to use reading, writing and calculation for his own and the community's development.

And conversely:

- A person is *illiterate* who cannot with understanding both read and write a short simple statement on his everyday life.
- A person is *functionally illiterate* who cannot engage in all those activities in which literacy is required foreffective functioning of his group and community and also for enabling him to continue to use reading, writing and calculation for his own and the community's development.

While these definitions set out a framework to permit analysis of literacy capabilities of a given population, the difficulties in accomplishing such an analysis are well recognized. For example, a common characteristic of many people with severe literacy problems is the fact that they are unwilling to admit that they have a problem and often go to great lengths to cover up the fact that they cannot read. This poses a major difficulty in trying to determine the number of people with literacy problems and, of course, has significant implications for possible remedies. A further obstacle to the practical usage of the UNESCO definitions is that studies and surveys carried out to determine the number of people in these categories are, for many reasons, usually only administered to small segments of the population.

In the consequent absence of comprehensive quantitative data, school enrolment and educational attainment have become the usual gauges for measuring literacy. There are, of course, a number of objections that can be levelled at this approach. For example, grade level of education is commonly used for the purpose of comparing literacy between different jurisdictions and over time; yet it is apparent that, as a measure of reading ability, grade level does not, in fact, have equivalent significance across jurisdictions or over time.

In addition to the fact that available school-leaving statistics do not necessarily correlate with individuals' abilities to function or even read, other factors contribute to difficulties in isolating meaningful statistics. These factors include disagreement that persists over what constitutes *illiteracy* and *functional illiteracy*, at what age one is considered an adult, the fact that most surveys (including the heavily relied upon census) depend upon what people say about their educational attainment, and bias (whether conscious or unconscious) on the part of survey takers, survey and questionnaire designers, and tests designed to measure reading/writing competency or coping ability.

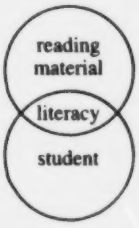
In spite of inherent inadequacies, there is strong justification for the use of educational level as a measure of literacy. It is felt that in looking at those adults with less than Grade 9 education there is a strong likelihood that one or both of the following would prevail: that the person was reading at the lower end or below grade level; that the person would have poor reading habits. In either case it is felt that they are likely to be reading at a lower reading level than their educational attainment would suggest. While this approach undoubtedly has substantial validity, it is important to acknowledge that there will be exceptions to generalizations at every turn (e.g. adults with less than Grade 9 who have achieved a higher level of literacy and others who have completed more grades of schooling, but who are still functionally illiterate). Further confusing the application of this criterion for measuring literacy, is the fact that the educational system in Ontario has become one that discourages failing students to the extent that most students will reach high school by age 16 regardless of reading ability.

In examining the dimensions of illiteracy in Canada, Cairns writes that 'debates about literacy and illiteracy which concentrate on levels of reading and writing are misleading; the real issue is whether people possess the education and skills necessary to participate fully and productively in the life of their society.'[3]

Bormuth moves further in this direction with a view of literacy which, although it focuses more on printed matter, considers the two-way literacy connection. He has stated that literacy itself seems to be 'the actual potential for exchanging information through the written word.'[4] Bormuth sees this description as compatible with the basic dictionary definition of literacy, i.e. the ability to read and write which, among several other things, could mean the actual potential for exchanging information through the written word. The description also recognizes that 'Just as two people would differ in literacy if they had differing levels of, say, reading skill but access to an identical quantity and quality of materials, they would also differ in literacy if they had identical levels of reading skills but access to very different quantities and qualities of materials.'[5]

Practical application of this approach has been carried out by Kirkwood and Wolfe[6] in research that has been concerned predominantly with the measurement and calculation of literacy in schools, and in which they examine the matching of the skill of the reader and the difficulty or accessibility of materials. The methodology used in this research makes extensive use of the cloze procedure,[7] and the measure of success of the information transfer depends, to a large extent, on whether the students have sufficient linguistic ability to understand the language of the reading material or, conversely, on whether the materials are written at a level of linguistic complexity appropriate to the language ability of the students.

A survey conducted by Kirkwood[8] and Wolfe using the cloze procedure of testing, and involving more than 7,000 Ontario students, examined the matching of students and language arts reading materials. In this survey, approximately 28 per cent of Grade 4 students, 38 per cent of Grade 7, and 37 per cent of Grade 10 students were considered 'literates' on the basis of the literacy 'match' between the students and the particular curricula materials. The general reading ability of the student tended to crystalize around Grade 7.



The degree of match or lack of match appropriate between reading ability and readability of materials will vary according to what one intends to achieve by the exposure. Where the main objective is to convey factual information (e.g. health and safety information), the importance of achieving a good match is increased.

The foregoing approaches do not explicitly, or, for that matter implicitly, preclude the multi-language dimension from the treatment of literacy. However, they do not specifically set out distinctions that inevitably exist between these different literacy elements in a predominantly English speaking but multicultural society. If the quantity and quality of written materials and other means of communication are not made available and provided for

minority language groups consistent with their provision to the English speaking population or where the needs of one group are not met to an extent consistent with the needs of another, in effect, the functional literacy of diverse elements in society will not be the same, regardless of reading and writing capabilities.

Furthermore, difficulties that arise in analysis of statistics on educational attainment as a means of measuring literacy are less definitive in conveying, for example: one's literacy in English; the 'significance' of reported grade level as between jurisdictions; or the numbers in the population with higher levels of education, and who are probably literate in their native language, but whose usage of English may be lacking.

References

1 Sticht, Thomas G., ed. *Reading for Working: A Function Literacy Anthology*. Alexandria, Va.: Human Resources Research Organization, 1975, p.4.
2 Hunter, Carman St. John and Harman, David. *Adult Illiteracy in the United States*. New York: McGraw Hill Book Company, 1979, p.7.
3 *Adult Illiteracy in Canada – A Challenge*. Canadian Commission for UNESCO. Occasional Paper 42, summer 1983, p.3 (Introduction by Cairns, John C.).
4 Bormuth, John R. Visible Language. *The Journal for Research on the Visual Media of Language Expression*.
5 *Ibid*.
6 Kirkwood, K.J. and Wolfe, R.G. *Matching Students and Reading Materials*. Ontario Ministry of Education, 1980.
7 For references, see 6 *op.cit*.
8 Described in meeting with the task force.

APPENDIX II

Re: Language and the Occupational Health and Safety Act, 1978

Language is a subject the advisory council considered previously in the context of a specific request from the Minister of Labour. Citing the requirement, mandatory under the Act, that employers post in the workplace a copy of the Act and any explanatory material prepared by the ministry, both in English and in the majority language of the workplace, the Minister of Labour indicated to council in his letter of July 17, 1979, that he felt it would be helpful to many employers if the ministry were to produce some of its materials in those languages likely to be the majority in different workplaces. While also indicating the need to be conscious of the potential cost implications, the minister sought the advice of council as to the languages it would see as most appropriate for such materials and also invited council's comments on the kinds of materials which should be translated first.

At that time, council felt that, while it would not be practical to translate all the regulations, guidelines, codes of practice and data sheets into the languages selected, for the purpose of prevention, comprehension of the ideas inherent in the regulations and guidelines should be conveyed to the workplace in such a manner that language would not pose a barrier. Council felt further that the ministry might usefully consider developing signs with easily understood pictographic instructions with a short caption in the majority languages of the workplace on an industry basis, and that these signs could be developed selectively, based on the risks inherent in industries, processes, and equipment.

Reference

For the complete text of this correspondence, see *Advisory Council on Occupational Health and Occupational Safety Second Annual Report April 1, 1979 to March 31, 1980*; pp. 185-94.

APPENDIX III

Table 1. Population 15 Years and Over, Total and With Level of Schooling Less than Grade 9, Canada and Ontario[1]

		Population 15 years and over	*Less than Grade 9*	*Less than Grade 9 as % of Canadian Total*
1981*	Canada	18,609,285	3,851,285	100
	%	100	20.7	
	Ontario	6,649,725	1,206,240	31.3
	%	100	18.1	
1976 adjusted**				
	Canada	16,890,350	4,285,390	100
	%	100	25.4	
	Ontario	6,117,135	1,360,265	31.7
	%	100	22.2	
1976***				
	Canada	15,402,025	4,376,655	100
	%	100	28.4	
	Ontario	5,550,345	1,393,935	31.85
	%	100	25.1	

Table 2. Population 15 Years and Over, by Age, by Level of Education, Ontario[1]

		Total 15 and +	*15-24*	*25-44*	*45-64*	*65 +*
1981*	TOTAL	6,649,725	1,591,690	2,520,610	1,733,140	804,285
	<Grade 9	1,206,240	54,920	259,350	512,815	379,160
	<Grade 9 as % of total in age group	18.1	3.5	10.3	30.5	47.1
1976 adjusted**						
	TOTAL	6,117,135	1,546,635	2,260,830	1,623,395	686,270
	<Grade 9	1,360,265	75,550	368,630	543,125	372,965
	<Grade 9 as % of total	22.2	4.9	16.3	33.5	54.3
1976***						
	TOTAL	5,550,345	973,095	2,213,270	1,625,660	738,315
	<Grade 9	1,393,935	66,155	371,410	548,645	407,740
	<Grade 9 as % of total in age group	25.1	6.8	16.8	33.7	55.2

[1] See explanatory notes on page following.

* Excludes inmates of institutions.

** As adjusted by Statistics Canada to take into account, to the extent feasible, changes introduced in the 1981 Census;
Excludes inmates of institutions.

*** Not attending school full time (excludes those attending school full time);
Includes inmates of institutions.

SOURCE: Statistics Canada, 1981 Census of Canada, *Population-Historical Tables for Census Education Data, 1971, 1976 and 1981* (Catalogue #13-579, Occasional); 1976 Census of Canada, *Demographic Characteristics: Level of schooling by age groups* (Catalogue #92-827)

Explanatory Notes

Owing to a number of conceptual and methodological changes, 1981 Census education data are not directly comparable to those for previous years. Major factors affecting disparities in comparability are briefly summarized below. For more complete documentation of changes that have taken place, refer to Statistics Canada and various Statistics Canada publications, including the following: *Historical Tables for Census Education Data 1971, 1976 and 1981* (Catalogue #13-579 Occasional), 1981 Census Dictionary (Catalogue #99-901), *Data Quality – Sample Population* (Catalogue #99-905), and *Cautionary Note on 1976 Census School Attendance Data* (Catalogue #92-826, Bulletin 2.7 Occasional). The methodological changes specifically affecting comparisons of 1981 data with those of 1976 relate to changes in sampling ratio and the exclusion of inmates of institutions as part of the subpopulation answering the 1981 education questions. Statistics Canada defines 'inmate' as a resident of an 'institutional' collective dwelling other than staff members and their families. 'Institutional' collective dwellings are orphanages and children's homes, special care homes and institutions for the elderly and chronically ill, general hospitals, psychiatric hospitals, treatment centres and institutions for the physically handicapped, penal and correctional institutions, juvenile delinquent homes and jails.

Census education data are not reported for approximately 250,000 inmates 15 years of age and over in 1981 in Canada. In 1976, the corresponding count for this inmate subpopulation was 215,000. (It should be noted that, relative to the total population 15 years and over, 'inmates of institutions' can be expected to encompass a disproportionately large number of individuals with less than Grade 9 level of schooling, viz. in 1976 approximately 67 per cent of Canada's and 65 per cent of Ontario's inmate population had less than Grade 9 level of schooling.)

The major conceptual change that has taken place in the census education variables relates to what in past censuses was noted as post-secondary, non-university school. This effected very little conceptual variation with respect to the categories of data shown above. It should be noted, however, that the 1981 and 1976 adjusted figures shown above for population 15 years and over include those 'attending school full time' as well as those 'not attending school full time.' In 1981, the inclusion of those (15 years and over) 'attending school full time' accounts for approximately 2.2 million in Canada and 0.8 million in Ontario and a disportionately smaller increase in the category less than Grade 9, i.e. approximately 66.5 thousand and 17.6 thousand in Canada and Ontario respectively.

APPENDIX IV

Readability Levels of Common Print Materials

Workers Compensation Board information for workers and employers regarding compensation claims.

WCB information on Bracing Masonry walls.

Fire Prevention Canada - X'Mas Safety hints.

Primadent Children's Toothpaste.

Employment and Immigration Canada - UI and You: when you reach 65.

Alberta Consumer and Corporate Affairs -
Contracts information.
Kinds of credit.
Credit problems.
In debt?

Alberta Solicitor General - Operator's manual.

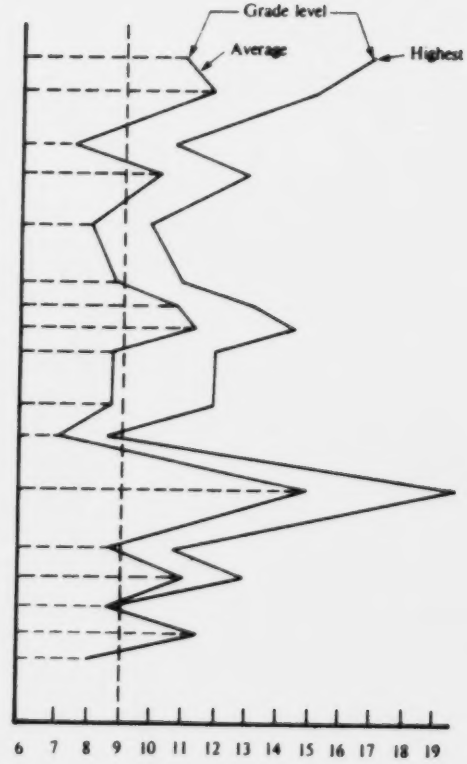
Cancer Society Breast self-examination.

Alberta Labor - Occupational Health and Safety.

Hydrogen Sulphide information.

Canada Savings Bond brochure.

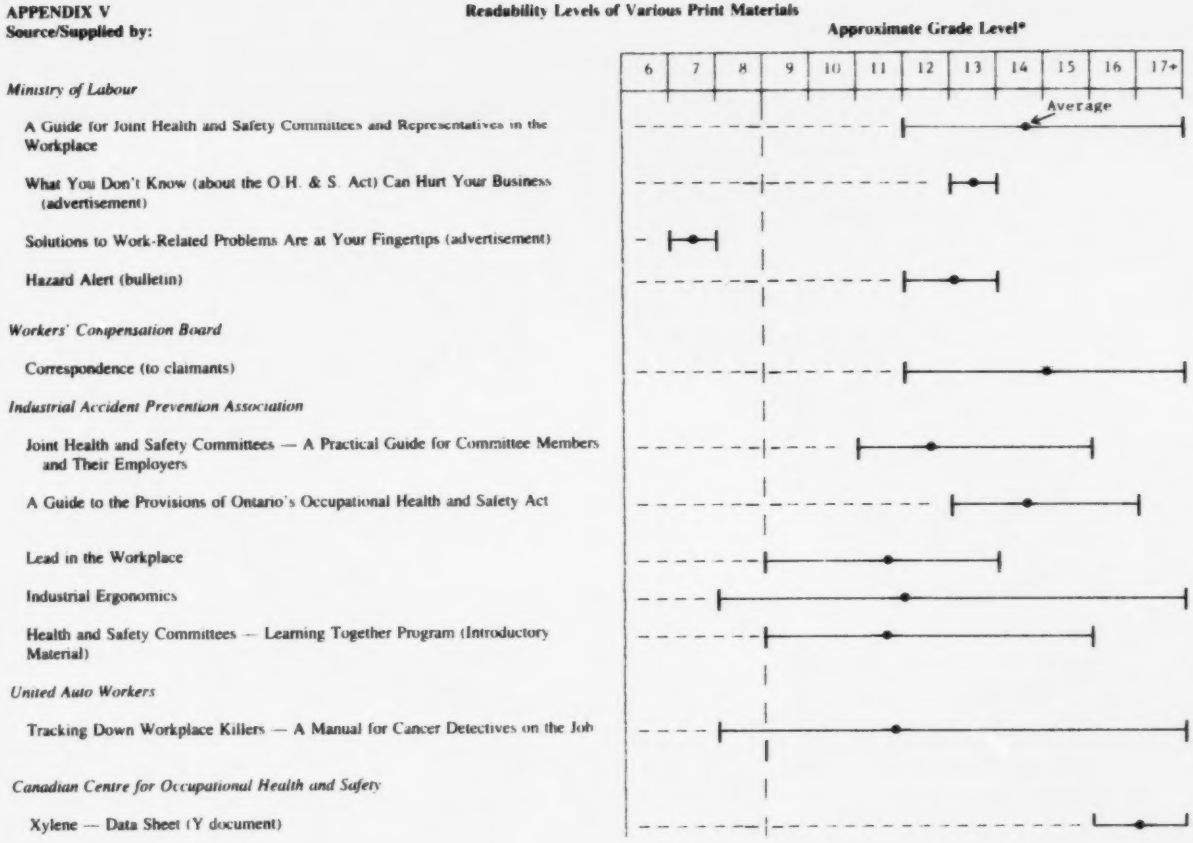
Edmonton Journal sports pages.
The Sun (Tabloid).
Time, Guardian, Daily Express, Daily Mirror.
Toronto Star.



Source: *Access Alberta:* Adult Illiteracy Project, 1979, p. 3 and 4. As depicted in *Continuing Education: The Third System*, a discussion paper published by the Ontario Ministry of Education and the Ministry of Colleges and Universities.

APPENDIX V

Readability Levels of Various Print Materials


Approximate Grade Level*
6
7
8
9
10
11
12
13
14
15
16
17+
Average
Source/Supplied by:
Ministry of Labour
A Guide for Joint Health and Safety Committees and Representatives in the Workplace
What You Don't Know (about the O.H. & S. Act) Can Hurt Your Business (advertisement)
Solutions to Work-Related Problems Are at Your Fingertips (advertisement)
Hazard Alert (bulletin)
Workers' Compensation Board
Correspondence (to claimants)
Industrial Accident Prevention Association
Joint Health and Safety Committees — A Practical Guide for Committee Members and Their Employers
A Guide to the Provisions of Ontario's Occupational Health and Safety Act
Lead in the Workplace
Industrial Ergonomics
Health and Safety Committees — Learning Together Program (Introductory Material)
United Auto Workers
Tracking Down Workplace Killers — A Manual for Cancer Detectives on the Job
Canadian Centre for Occupational Health and Safety
Xylene — Data Sheet (Y document)

*According to Fry Readability Graph based on random sample of from 1 – 4 passages per title

Note: A small sample of print materials from a variety of sources was selected for testing to demonstrate readability of a range of materials in use. The sample tested should not be interpreted as representative of the range of print materials available from any given source noted. The format of many materials is not conducive to the use of the testing technique which has been applied here.
See also discussion of readability formulae in Appendix VI and body of report.

APPENDIX VI

Re: Readability Formulae

To assess the approximate readability level of various print materials in this instance, an approach based on the Fry Readability Graph[1] was used. Dependant on the length and apparent variability of the text, a sample of from one to four one-hundred-word passages was taken. The number of sentences and syllables in each passage was counted and plotted on the Fry graph to estimate the range of readability within the print material. To indicate the average readability of the material, an average of the number of sentences and syllables in the passages sampled was plotted on the graph.

A note of caution is merited when utilizing the results of readability analyses. For example, Kirkwood observes[2] that mechanical readability formulae extensively utilize surface structure as a basis for measurement; that is, word length, number of letters or syllables per word, sentence length, number of syllables or words per sentence or some other unit such as subordinate clauses. Differences between mechanical readability formulae rest primarily with the particular definition of 'familiar' words and the weights assigned to different variables. In general, however, in the 'natural population of conventional reading materials' (i.e. materials that are not edited specifically to lower apparent readability as measured by the surface variables in the formula), there is a strong correlation between surface complexity and complexity in the deep structure. The readability information produced by one formula is highly correlated with that produced by another, and the inherent problem is less with measuring difficulty of materials and more with that of determining performance or what populations the numeric scales or 'grade equivalent' scores refer to.[3]

It is apparent that the ability of an individual to read and comprehend a selection of written materials will be influenced by his or her familiarity with, and understanding of, the particular subject matter. For that reason, Kirkwood suggests that a better appreciation of the extent to which the message contained in printed matter can be assessed by workers or employers for whom it is intended might be obtained through the use of other testing methods. For example, a more effective indicator of whether individuals can read and understand a passage may be to have them read and then answer questions about facts contained in the materials. An alternative would be to examine the match between reading ability and readability by other methods, e.g. Cloze procedure.[4] In any case, it would appear prudent to field test materials with a sample 'audience' before they are mass produced and distributed.

References

1 Fry, Edward. Readability Graph: Clarification, Validity and Extension to Level 17. *Journal of Reading*. 21: No.3; December 1977, p.249.

2 In a meeting with the task force and background information provided.

3 Kirkwood, K.J. and Wolfe, R.G. *Matching Students and Reading Materials*. Ontario Ministry of Education, 1980.

4 See previous Appendix I *Re: Defining and Measuring Literacy* and 3 *op.cit.*

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May 1, 1985.

Dr. D.R. McCalla
Chairman
Advisory Council on
Occupational Health and Safety
400 University Avenue
15th Floor
Toronto, Ontario
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Dear Dr. McCalla:

Thank you for your letter submitting to me Advisory Memorandum 84-IV Concerning Policies and Priorities for Dealing With Literacy and Occupational Health and Safety, together with the supporting task force document from which the recommendations are adopted.

As you have indicated in your letter, in a multicultural society as exists in Ontario, the issues arising from illiteracy as it relates to occupational health and safety are significant and diverse with broad ramifications. The memorandum is under study by my officials and I will forward a final reply to the Council's advice on this important issue within the near future.

Please extend my thanks to Council members and to the task force who worked so diligently on this memorandum.

Yours sincerely,

R.H. Ramsay,
Minister

Scientific Task Force on Talc

Report of Committee to Review Certain Questions Concerning the Health Effects of Fibrous Dust Particles in Talc

Submitted to
The Honourable R.H. Ramsay
Minister of Labour
Ontario

by
D.C.F. Muir, M.D.
Chairman
Scientific Task Force on Talc

September 1984

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1. ESTABLISHMENT OF THE COMMITTEE

The Scientific Task Force on Talc was established, as an independent technical committee, by the Advisory Council on Occupational Health and Occupational Safety at the request of the Minister of Labour. The committee's mandate was to inquire into certain aspects of the health effects of fibrous particles in talc and to submit its report directly to the Minister of Labour. The specific questions were as follows:

a) Is there adequate evidence to correlate exposure of 'fibres' derived from silicates of the asbestos group that occur in the form of cleavage fragments, with adverse effects on health?
b) Do the known, suspected or predicted effects on health of exposure to such fibres warrant control under the asbestos regulation or should a 'mineral fibre' regulation be developed?

The committee began work in August 1983 and the present report was presented in September 1984.

2. MEMBERS OF THE COMMITTEE

ADVISORY COUNCIL ON OCCUPATIONAL HEALTH AND OCCUPATIONAL SAFETY

Scientific Task Force on Talc

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3. APPROACH ADOPTED BY THE COMMITTEE

Published scientific evidence was collected and reviewed by the committee. It was evident that only limited epidemiological evidence on the health effects of talc was available and that much of this was contentious and a matter of dispute. For this reason a formal analysis of epidemiological information was not undertaken. However, this exercise will be necessary at the later stage if it is decided to proceed to the establishment of legislation for the control of mineral fibres other than asbestos.

Knowledgeable individuals in industry, government and the academic field were contacted and invited to present their views to the committee. This resulted in a fruitful exchange of views and to an understanding of the difficulty of the issues. Formal evidence was not taken and individual comments by witnesses will not be presented.

Members of the committee met to consider the implications of the scientific evidence and their conclusions form the main text of this report.

4. INDIVIDUALS GIVING EVIDENCE TO THE COMMITTEE

Mr. Peter Barnes, President
Canada Talc Industries Limited

Mr. John Richardson, Marketing Manager
Canada Talc Industries Limited

Dr. Elizabeth Kaegi, Medical Director
C-I-L Incorporated

Mr. William Hicks, Mineralogist
Ontario Ministry of Natural Resources

Mr. Geoffry Minnes, Policy Analyst
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Mr. Donald Brown, Consultant, Resource Section
Ontario Ministry of Labour, Occupational Health Branch

Mr. Gyan Rajhans, Chief
Ontario Ministry of Labour, Occupational Health Branch

Mr. Allan Harvey, Director, Environmental Affairs
R. T. Vanderbilt Company Incorporated

Mr. Konrad Reiger, Ceramic Engineer
R. T. Vanderbilt Company Incorporated

Mr. R. S. Grindley, Marketing Manager
Steetley Talc Limited

Mr. Ken Houghton, Vice President & General Manager
Steetley Industries Limited

Mr. Donald Taylor, Manager, Research & Development
Steetley Industries Limited

THE TALC PROBLEM

Introduction

Controversy concerning the distinction between the health effects of asbestos and talc has continued for a number of years. The purpose of the present report is to identify the origin and nature of this issue and to consider the merits of various approaches that might be helpful for legislative purposes.

Terminology

Many of the difficulties concerning the health aspects of talc arise because of confusion in the use of terminology. Important terms such as asbestos, asbestiform, and fibres have different meanings to the various concerned groups: mineralogists, regulatory agencies, medical scientists and industry. This issue of terminology was addressed some years ago in a U.S. Bureau of Mines Report (Campbell, 1977). Some of the following definitions were used in that report.

1) *Asbestiform varieties of minerals*

Some minerals exist in a variety of forms which can be distinguished according to the physical properties of the individual crystals and particularly their shape (crystal habit). One variety, the asbestiform habit, can be macroscopically observed by examination of the mineral and is a special form of natural fibrosity, characterized by the presence of fibres resembling organic fibres and having generally high tensile strength and flexibility.

2) *Asbestos* (the common use of the term)

Asbestiform varieties of some minerals are of industrial importance. In its common usage the term asbestos refers to such materials without distinction of fibre type or of geological origin. The following table shows the names of the four minerals together with the names of their asbestiform varieties which are used in industry.

Mineral Name	*Asbestiform Variety*
Serpentine	Chrysotile
Anthophyllite	Anthophyllite asbestos
Cummingtonite-Grunerite	Cummingtonite-Grunerite asbestos
Riebeckite	Crocidolite

3) *Asbestos* (mineralogical sense)

This suffix is used to identify the asbestiform variety of a mineral (for example, anthophyllite asbestos) when a specific name (for example, chrysotile) is not available.

4) *Tremolite-actinolite series*

Tremolite is one of the minerals that can occur in an asbestiform variety but does not appear to have been mined for commercial exploitation. Tremolite and/or tremolite asbestos may occur as a contaminant in many industrial minerals, including talc.

5) *Talc*

Talc is also a term having mineralogical and commercial definitions. In its mineralogical sense, it is a specific mineral which generally crystallizes in the form of flat-plates. The fibrous habit is very uncommon. Commercial talc contains a varying proportion of the talc mineral. Low grade talc may consist of a wide variety of minerals. High grade samples may consist of almost pure talc.

Overlap Between Asbestos and Talc

Sources of confusion may arise as follows:

1) Deposits of talc may be contaminated by chrysotile, tremolite asbestos, anthophyllite asbestos.
2) Deposits of talc may be contaminated with non-asbestiform varieties of asbestos-forming minerals, (e.g. non-fibrous tremolite).
3) Very rarely fibrous varieties of talc may occur.
4) Some of the non-asbestiform varieties of the minerals listed above, and also talc, can be seen to contain elongated dust particles which are similar to some of the fibres commonly found in asbestos. Some of these elongated dust particles may be produced by comminution or fracture of the rock during processing. These cleavage fragments are sometimes called acicular (i.e. needlelike) particles.
5) In unskilled hands the edges of platy talc dust may appear,on microscopy, to resemble fibres.

The Legal Argument

The points of overlap described above have been developed in two directions:

a) One point of view contends that the term asbestos should be restricted to material that is known to have crystallized in the asbestiform manner. In this view, unequivocal identification is only possible if a macroscopic sample of the source material is available. This view is supported by mineralogists (Campbell *et al* 1977). This argument further proposes that other types of elongated dust particles, such as the acicular cleavage fragments mentioned above, must be separately evaluated as to their specific health risk, if any.
b) An alternative view maintains that all fibres derived from the minerals listed above may be microscopically, chemically and crystalographically indistinguishable from asbestos and, therefore, may be considered to have similar biological activities. Since the definition of asbestos in some jurisdictions is based only upon the microscopic shape and size, this view achieves a certain official status.

Comment

In considering the merits of these arguments, the committee was struck by certain problems associated with each view. Although it is apparent that the asbestos-forming minerals may crystallize both in asbestiform habit or in a nonfibrous one, the distinction between the two is by no means clear-cut, especially for amphiboles. Asbestiform varieties may be associated with varying degrees of the non-fibrous variety and vice versa.

The difficulty with the second approach is that it leads to a situation whereby a sample of non-asbestiform tremolite or talc may be considered to contain asbestos in its legal sense once the material has been processed.

The underlying considerations behind these arguments, of course, are the questions of whether a given material presents a health hazard to workers, and how legislation should be framed to provide for their protection. The problem is to distinguish the point at which a laudable wish to err on the side of safety and regard all elongated dust particles which look as if they might be asbestos fibres as indeed being asbestos, is carried to the point where it no longer provides effective worker protection, but simply interferes with important economic activity.

The task before the committee was thus to consider whether it is possible to identify acicular fragments in a sample of talc, to distinguish them from contamination by one of the varieties of asbestos, and to summarize any information concerning their health effects. Two questions were specified by the Minister of Labour in correspondence between August 31, 1983 in the following terms:

1) Is there adequate evidence to correlate exposure of 'fibres', derived from silicates of the asbestos group that occur in the form of cleavage fragments, with adverse effects on health?
2) Do the known, suspected or predicted effects on health of exposure to such fibres warrant control under the asbestos regulation, or should a 'mineral fibre' regulation be developed?

The Distinction Between Fibres and Acicular Fragments

The commercial meaning of the name 'asbestos' is described above. Airborne fibres resulting from the processing of this material may quite sensibly be regarded as being asbestos fibres. This resulted in the first steps to a definition when a group of British asbestos companies wished to compare counting methods in 1958. For convenience it was decided to restrict the comparison to the counting of elongated particles (i.e. fibres), and not to include any non-fibrous particles which may have been present in the air of the factories. To assist the technicians, it was ruled that any particle having an aspect ratio of 3:1 (the ratio of length to diameter) or greater was to be considered as a fibre and was to be included in the count. Since the factories were processing asbestos it was, of course, assumed that the counted particles were asbestos fibres. It was not intended or implied that this choice of 3:1 ratio had any biological significance or that it could be used to identify asbestos fibres in other situations.

At a later stage when the microscopic rules for use with membrane filters were developed, the 3:1 aspect ratio rule was not discarded. The rules

exclude particles having diameters greater than 3 micron and include only those having a length greater than 5 micron. The diameter restriction relates to aerodynamic considerations developed by Timbrell (1965) who showed that this was the upper limit of fibre diameter which could penetrate into the finer airways of the lung during breathing. The length criterion was based on the belief that this was the minimum length that caused asbestosis.

It is noticeable that a very serious weakness exists in the counting rules, described above, which are widely used for regulatory purposes in the absence of any kind of chemical or crystalographical characterization. Therefore, the use of the method should be restricted to specific situations where other information is available concerning the provenance and nature of the dust.

The decision to estimate the health hazard in asbestos industries by the use of the above counting rule was based on biological considerations which appeared to emphasize the importance of long fibres. It was not supposed that all the fibres in the cloud would be counted. The use of electron microscopy has, in fact, demonstrated that only a small fraction of the total cloud is counted. Evidently there are many alternative counting possibilities and the complexity was well summarized by Lynch, *et al* (1970) in the following terms:

> 'It is rarely possible to make an absolute measurement of that characteristic of an airborne dust which is directly responsible for its biological effect. To be practical, measurement for the purpose of assessing hazard and evaluating control must not only be convenient and relevant but also permit the use of statistically adequate sampling strategies . . . In measuring the concentration of a gas in air there is only one attribute to be measured and one accurate methodgives the same result as another. With granular dust, however, the attribute could be either number or weight and, with fibrous dust, length gives another degree of freedom; furthermore, a dust of mixed fibres and grains gives yet another. Because of this variety of attributes, there could be as many as 100 indices of exposure to the asbestos in a dust cloud.'

The Relation Between Fibre Size and Shape and the Risk to the Health of Workers

Present evidence suggests that the health hazard associated with airborne fibres is related to their size and shape. Because this evidence is central to the proposals of the committee, a short summary is presented. This is a complicated area and we recognize that the following summary represents only the major points and is not intended to be comprehensive.

Early studies on the pathogenicity of fibres of different lengths was undertaken by Gardner (1942) in experiments carried out on behalf of the asbestos industry. It was known at that time that quartz became more toxic as the dust was ground to progressively smaller size. However, Gardner (1942) claimed that chrysotile apparently lost its fibrogenicity when treated in this way. King *et al* (1946) produced pulmonary fibrosis in rabbits with both long and short fibre samples but their results are difficult to interpret because of the very large doses used. Vorwald *et al* (1951), from the same laboratory as Gardner, reported an extensive series of experiments again claiming

that fibrosis could only be produced by long fibres. Milled fibre also produced fibrosis in their animals but they interpreted this as being due to the presence of a few (0.6%) long fibres. The dust levels in their experiments were so high that the concentration of long fibres was certainly a potential explanation of the observed pathology. The fibrogenic importance of fibre size continued to be studied but a new impetus was provided by Stanton and Wrench (1972) and Pott (1978) who published results which suggest that the properties of fibres which cause malignant disease also related to their size. They found that the pathogenicity of fibres increases rapidly for those having diameters less than 1 micron and lengths greater than 10 micron. The aspect ratio per se does not appear to be an independent variable having biological significance and it would reduce confusion if the term ceased to be used. A further consequence of the findings of the above authors was that the chemical composition of the fibre does not appear to be important in its carcinogenicity. It was this observation that led to the suggestion that fibres of the critical size might be a cause of human cancer even if they were not derived from asbestos. The carcinogenic potential is also likely to be related directly to the residence time of the fibre in the lung and, thus, to their solubility. We have no information concerning the persistence of acicular fragments in biological fluids.

It is most important to stress the *relative* potency of fibres of different sizes. Stanton himself emphasized this point and made no claim that shorter fibres were free of toxic effects (Stanton *et al* 1981). Furthermore, it is possible that methods of producing short fibres for use in animal experiments may alter the crystal structure in such a way that changes in the biological effects cannot be attributed solely to a reduction in the size of the fibres. Despite these reservations, the evidence from a number of workers (Wagner *et al*, 1980) is consistent and indicates that fibres longer than 10 micron and which have diameters less than 1 micron represent the major hazard in an aerosol containing a range of fibre sizes.

It thus seems that an evaluation of the health hazards of asbestos fibres or of acicular fragments from non-asbestiform tremolite (or, indeed, of elongated dust particles from other amphiboles or minerals) might reasonably be based on the concentration of airborne particles which are longer than 10 micron and which are less than 1 micron in diameter.

Size Distribution of Fibres Derived From Asbestos and of Acicular Fragments Derived From Non-Asbestiform Minerals

The size distribution of acicular fragments was examined by Campbell *et al* (1979) and compared to that of tremolite asbestos. The latter contained many fibres longer than 10 micron having a diameter less than 1 micron and this is probably a characteristic property of all true asbestos. Their results showed that acicular fragments are quite different and have few fibres within the critical range. With occasional exceptions, most acicular fragments were shorter and thicker.

Epidemiological Evidence Concerning The Health Effects of Talc

Epidemiological evidence concerning the health of talc workers is difficult to evaluate and is the subject of ongoing controversy. The problems of evaluating the health outcome dispute is compounded by uncertainty concerning the environmental exposure information. There does not appear

to be reliable epidemiological evidence concerning the health of workers known to be exposed to significant concentrations of acicular fragments in the proven absence of contamination by asbestos fibres.

Synthesis

It appears that there is a characteristic size distribution associated with fibres derived from true asbestiform minerals and that this is very different from that associated with acicular fragments or of elongated dust particles derived from non-asbestiform minerals. There is persuasive indirect evidence (see authors cited above) that, as a result of this difference in size distribution and also of some possible differences at the level of some other physical characteristics, as (for example, surface characteristics), the health effects associated with asbestos exposure will be quantitatively different from those associated with exposure to elongated dust particles derived from other sources. This may be not only because of differences in the size of the dust particles, but also because of their mineralogical characteristics. However, on the basis of microscopical examinations, both would be included without distinction under the present counting rules which are used for regulatory purposes and which were developed for the control of asbestos exposure. A given sample of talc contaminated with acicular fragments might thus be judged to be a highly hazardous dust even though it contained very few fibres of the size described above.

The following diagrams illustrate the difficulty of using the asbestos counting rules for estimating the health hazard of other fibrous aerosols:

The length distribution of particles derived from a sample of asbestos and which would be included in a count using the present rules might be represented as follows:

The length distribution of particles derived from acicular fragments and which would also be included in a count using the same counting rules, might be:

In each case the total count would be the same, i.e. 10. However, the acicular sample contains a much lower proportion of long fibres and the two samples are thus unlikely to represent the same health hazard.

Unfortunately we do not have adequate information concerning the size distribution of acicular fragments to know how accurately the above diagrams represent the true situation. The work of Campbell *et al* (1979) suggests that acicular fragments are characterized by a high proportion of short, wide fragments with relatively few long, thin fibres. For this reason a smaller portion of all the airborne particles from an aerosol containing acicular frag-

ments would be included in a count using the usual rules. This is in sharp contrast to the higher proportion which would be included if the source of the dust had been true asbestos. The very real differences in the overall size distribution of airborne dusts derived from the two sources suggests there will also be important differences in the particle size distribution within that fraction of the cloud included in a standard count. It is for this reason that the rules developed for counting asbestos cannot be assumed to be appropriate for counting acicular fragments.

The above diagrams also illustrate the important point that acicular fragments may contain a limited number of the long, thin fibres which appear to be the major potential hazard in aerosols containing fibrous particles.

In this context our replies to the specific questions are thus:

1) There is sufficient circumstantial evidence to suggest that a restricted portion of the cleavage fragments or acicular fibres in a sample of talc group may have adverse health effects.
2) The asbestos regulations are not appropriate for legislative purposes in the circumstances. Modification of the current regulations or the development of new regulations is suggested.

Administrative Issues

We have concluded that current asbestos counting regulations are inappropriate for evaluation of the health hazard of talc. However, it is evident that certain specimens of talc may be contaminated with asbestos to which the regulations would certainly apply.

1) The following areas require consideration in formulating policy:
   - Certain deposits of talc in various countries have been studied in great detail and can reasonably be assumed to be free of asbestos fibres.
   - In other situations asbestos contamination is highly suspected. Moreover, users of talc may obtain supplies from a variety of sources, some of which might contain asbestos fibres.

   This raises a most important administrative problem in determining when the 'asbestos rules' apply and when they do not during industrial hygiene surveys.

2) Two approaches might be considered to resolve this problem:
   a) During routine occupational hygiene surveys, it can only cause confusion to have a choice of counting rules. The best solution may be to continue using the established methods. If an industry disputes the results on the grounds that the fibres are not asbestos but are acicular fragments, then that industry must accept responsibility for proving their contention. This would require formal examination of the fibres by an independent expert within a previously established decision framework by which both industry and government would reach agreement.
   b) Alternatively, it may be appropriate to develop regulations in which the presence of asbestos is identified one way or the other by examination of the bulk material. The point at which contamination becomes significant has not, to our knowledge, been established and some initial experimental work may be required.

REFERENCES

Campbell, W.J., Steel, E.B., Virta, R.L., and Eisner, M.H., (1979), Relationship of mineral habit to size characteristics for tremolite cleavage fragments and fibers. Report of Investigation 8367, Bureau of Mines, U.S. Department of the Interior, Washington.

Gardner, L.U. (1942), Chrysotile asbestos as an indicator of subtle differences in animal tissues. American Review of Tuberculosis 45, 762-766.

King, E.J., Clegg, J.W. and Rae, V.M. (1946) Effect of asbestos and aluminum on lungs of rabbits. Thorax, 1, 188-197.

Lynch, J.R., Ayer, H.E. and Johnson, D.L. (1970), The Interrelationships of selected asbestos exposure indices. American Industrial Hygiene Association Journal, 31, 598-604.

Pott, F., (1978), Some aspects on the dosimetry of the carcinogenic potency of asbestos and other fibrous dusts. Staub, Reinhaltung der Luft. 38, 486-490.

Stanton, M.F., Tegeris, A., Miller, E., May, M., Morgan, E., and Smith, A., (1981), Relation of particle dimension to carcinogenicity in amphibole asbestoses and other fibrous minerals. Journal of the National Cancer Institute 67(5), 965-975.

Stanton, M.F. and Wrench, C., (1972) Mechanisms of mesothelioma induction with asbestos and fibrous glass. Journal of the National Cancer Institute. 48, 797-821.

Timbrell, V., (1965) The Inhalation of Fibrous Dusts, Annals of the New York Academy of Sciences. 132: 255-273.

Vorwald, A.J., Durkan, T.M., and Pratt, P.C., (1951), Experimental studies of asbestosis. A.M.A. Archives of Industrial Hygiene and Occupational Medicine, 3. 1-43.

Wagner, J.C., Berry, G. and Pooley, F.D., (1980), Carcinogenesis and mineral fibres. British Medical Bulletin 36, 53-56.

ACKNOWLEDGEMENTS

We express our thanks to staff of the Advisory Council on Occupational Health and Occupational Safety for their assistance in arranging sessions of the committee and for recording its deliberations. Our special thanks are due to Mrs. Virginia Biggar for her assistance.

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December 5, 1984

Dr. Dennis McCalla
Chairman
Advisory Council on Occupational Health
and Occupational Safety
400 University Avenue, 15th Floor
Toronto, Ontario
M7A 1T7

Dear Dr. McCalla:

As you know, on March 25, 1983 I requested that Council establish a technical committee on talc to report to me. I received the committee's final report in September 1984, and it was made available to Council last month. Attached is a copy of a letter that I have sent to the members of the Health and Safety Committee of the Ontario Federation of Labour, and to the parties who made submissions to Dr. Muir's Committee. A list of the parties is attached.

My officials are reviewing the report with a view to recommending to me an appropriate course of action. I wish to thank Council for its assistance.

Yours sincerely,

R. H. Ramsay
Minister

Attachments

Ontario

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Ministry of

400 University Avenue
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December 4, 1984

Dear

On March 25, 1983, I requested the Advisory Council on Occupational Health and Occupational Safety to establish a technical committee on talc to report to me through the Advisory Council. The persons appointed to the technical committee were Dr. Henry Anderson, Department of Health and Social Services, State of Wisconsin, Dr. J. Kramer, Department of Geology, McMaster University, Dr. D.C.F. Muir (Chairman), Occupational Health Program, McMaster University, and Dr. P. Sebastien, School of Occupational Health, McGill University.

The committee's terms of reference were to determine whether cleavage fragments which occur in commercial talc present a health hazard to workers and whether exposure to such particles should be controlled under the Regulation respecting Asbestos or by some other means such as a mineral fibre regulation. The committee began work in August 1983 and submitted its final report in September 1984. A copy of the report is attached for your information.

My officials are reviewing the report with a view to recommending to me an appropriate course of action. In the meantime, should you have any comments to make in relation to the report, you may wish to submit them to Mr. John Wilson, Program Development Unit, Occupational Health and Safety Division at the above-noted address.

Yours sincerely,

R. H. Ramsay
Minister

Attachment

Note: Distribution list not attached due to space limitations.

Follow-up correspondence to Previous Advisory Memoranda

Office of the
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of
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January 16, 1985

Dr. Dennis McCalla
Chairman
Advisory Council on Occupational
Health and Occupational Safety
15th Floor
400 University Avenue
Toronto, Ontario

Dear Dr. McCalla:

On May 10, 1983, I acknowledged receipt of Council's Advisory Memorandum 82-V concerning principles and procedures for the interpretation of epidemiological studies. The report was forwarded to me by Dr. Mustard in February and the appendix in April, 1983.

The appendix to the Advisory Memorandum has been studied closely by Ministry officials. I am informed that it will continue to be a valuable resource.

The Ministry has adopted the approach suggested by Council to use criteria to select the rank epidemiological studies used in regulation development. For example, in the development of the health effects documents for the benzene, arsenic and acrylonitrile regulations, ministry officials used this approach to assess the quality of epidemiological evidence.

My officials have found that Council's advice has been useful in the regulation development process. They look forward to any further advice on other issues, such as the evaluation of short term bioassay tests and animal evidence, which Council's Task Force on the Interpretation of Health Effects Data and the Role of Economic Analysis in the Standard Setting Process may consider appropriate.

Yours sincerely,

R. H. Ramsay
Minister

Advisory Council on Occupational Health & Occupational Safety
Ontario

Conseil consultatif de la santé et de la sécurité au travail

Office of the Chairman

Bureau du président

400 University Avenue
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March 12, 1985

The Honourable R. H. Ramsay
Minister of Labour
400 University Avenue
14th Floor
Toronto, Ontario
M7A 1T7

Dear Mr. Ramsay:

In your letter of January 16, 1985 regarding the principles and procedures for the interpretation of epidemiological studies you drew attention to other advice that council's Task Force on The Interpretation of Health Effects Data and the Role of Economic Analysis in the Standard Setting Process may consider appropriate. Specifically you drew attention to advice on evaluation of short-term bioassay tests and animal evidence.

Council notes the extensive work by the Organization for Economic Co-operation and Development (OECD) in this area. The OECD Test Guidelines contain generally formulated procedures for laboratory testing. Data generated in one country in accordance with both these guidelines and the OECD Principles of Good Laboratory Practice should be accepted in OECD countries for the purposes of assessing chemicals for properties or effects that may be hazardous to health or the environment. There are frequent addendums or revisions of the OECD Test Guidelines, which are designed to allow flexibility for expert judgement and adjustment to new developments.

These OECD documents provide guidance on the structure and design of specific bioassay and animal experiments for determining what constitutes 'good data' for tests to demonstrate specific properties.

The Criteria Working Group of the Workplace Hazardous Materials Information System (WHMIS) is in the process of developing criteria for determining which substances should be labelled as hazardous according to specific properties.

Council recognizes that, as Canada is a signatory country in the OECD, the ministry is currently using the OECD Test Guidelines and that members of your ministry are participating in the WHMIS discussions. However, the interpretation of data depends upon specific circumstances and upon the questions asked, e.g.: what weight to put on the interpretation of animal and bioassay results when there are, and when there are not, epidemiological studies available; and, how can the data be interpreted to determine the magnitude and nature of the risk to workers in Ontario? The fields of toxicokinetics and pharmacokinetics identify many of the factors that need to be considered and the means of taking these factors into account.

Council is presently discussing this issue in relation to determining criteria for selecting substances for regulation and control. Council concludes that, even though judgements have to be made, there is a need for basic principles and most importantly there is a need to enunciate the process of reaching specific decisions, i.e. list the studies that are considered and why, describe how the data were interpreted, and explain how they affected the decision. This process will be governed by the same principles enunciated in Advisory Memorandum 82-V.

If, however, there is a particular area of concern, which you feel the Advisory Council could help resolve, please let us know.

Yours truly,

D. R. McCalla
Chairman

c.c. to T. E. Armstrong, Q.C.
Dr. A. E. Robinson
B. Goodman

Ontario

Advisory Council on Occupational Health & Occupational Safety

Office of the Chairman

400 University Avenue
Toronto, Ontario
M7A 1T7
416/965-2448

April 19, 1984

The Honourable R. H. Ramsay
Minister of Labour
400 University Avenue, 14th Floor
TORONTO, Ontario

Dear Mr. Ramsay:

This is further to your letter of March 1, 1984, in which you advised Council that the ministry's Legal Branch is further reviewing the legal opinion received from the Ministry of the Attorney General on certain questions relating to the interpretation of the *Occupational Health and Safety Act* . The Advisory Council has decided, therefore, to respond at this time to a number of the points raised in your letter of May 18, 1983, relating to Advisory Memorandum 82-VII concerning the legal interpretation of the Act.

You state initially that you have some difficulty understanding Council's statement that 'any guidelines for the interpretation of the statute by the ministry's Legal Branch should be broad and flexible enough to encompass future developments and changes in attitude' and feel that such a policy would represent a departure from well-established principles of statutory construction set forth in the *Interpretation Act* . Council feels, however, that the situation in the workplace is a dynamic one and one into which new equipment, procedures and substances are being continually introduced. Many of these developments may have been difficult to foresee at the time the legislation was drafted and may give rise to circumstances not easily encompassed by a narrow reading of the Act.

Section 10 of the *Interpretation Act* states:

> Every Act shall be deemed to be remedial... and shall accordingly receive such fair, large and liberal construction and interpretation as will best ensure the attainment of the object of the Act according to its true intent, meaning and spirit.

Council was not suggesting that the ministry's Legal Branch 'depart from well-established principles of statutory construction' but felt that these principles allow for a broader interpretation of the 'right to refuse' provisions of the statute than that formulated by the ministry. The Advisory Council is of the opinion that a more liberal reading of the legislation is necessary for the better protection of the health and safety of workers in Ontario.

I turn now to your comments on the recommendations contained in the advisory memorandum. You argue that the words 'the physical condition of the workplace... is likely to endanger...' contained in section 23 cannot be interpreted to include hazards created by the physical condition of a worker in the workplace with the result that workers cannot refuse to perform unsafe work where they believe that they may be endangered by hazardous conditions created by other employees. You state that the conditions of the worker must have an effect in the physical condition of the workplace, such that there is likely to be a danger, before a worker may refuse to work. Council is of the opinion, however, that the physical condition of the worker is a necessary and integral part of the physical condition of the workplace and, as such, constitutes a sufficient reason for a refusal to work under section 23. While it is true that questions of a medical and/or subjective nature may be involved, any worker is entitled to refuse to work under section 23 on subjective grounds, i.e. if he or she has 'reason to believe' that a hazardous situation exists. The Act gives workers an initial right to refuse to work in the face of a perceived potential hazard and not simply an immediate one. For a worker to be required to wait until an 'effect' in the physical condition of the workplace is apparent may place the worker in unnecessary jeopardy, since the 'effect' may be the hazardous situation that was feared; for example, the situation in which a fellow worker under the influence of drugs or alcohol is operating a forklift with the result that the effect in the workplace is that some one is injured.

An alternate statutory route was suggested by you for dealing with these circumstances, namely that the worker report the existence of the hazard to his employer or supervisor under section 17(1)(d), both of whom are under a duty to take reasonable precautions to protect the worker. Council agrees that in some situations this may be a useful course of action for a worker to take and one which may resolve the problem. In other circumstances, however,it may not provide sufficient protection to the worker. Section 23 sets out a procedure whereby the circumstances of a refusal can be investigated in a systematic fashion and during which the worker need not resume work but must be allowed to be present during the investigation. Section 17(1)(d) merely requires the worker to report the hazard. He or she is presumably required to continue work until and during any investigation. Should the employer or supervisor refuse to investigate, or only conduct a cursory investigation which does not alleviate the worker's fears, the worker cannot refuse to work under this section even in the face of a very real hazard without risk of discipline.

Council recognizes that there may be potential problems in expanding the scope of the refusal to work provisions to include

additional subjective grounds, not only because of the difficulties involved in judging the reasonableness of subjective criteria under section 23, but also because of fears that such an expanded right might be used maliciously or frivolously in the workplace. Experience has shown, however, that the 'refusal' provisions of the Act have been used in a responsible manner by workers since their inception. Furthermore, although section 23(3) gives a worker the initial right to refuse to perform unsafe work on subjective grounds, in order for him to continue to refuse after an investigation has been conducted under section 23(4), the worker must demonstrate more objective reasons. If he cannot do so, he is not protected from disciplinary action by his employer. The Ontario Labour Relations Board has upheld disciplinary action against workers who have knowingly invoked false health and safety claims.

In conclusion, the Advisory Council is of the opinion that a more liberal interpretation of the provisions of the Act concerning the right to refuse unsafe work would be in keeping with the main purpose of the legislation; that is, to protect the health and safety of workers covered by the statute. Council hopes that its advice will be kept in mind as your officials review the Attorney General's opinion and it looks forward to the chance to study this opinion in the near future.

Yours truly,

D. R. McCalla
Chairman

cc to: T. E. Armstrong, Q.C.
Dr. A. E. Robinson
Mr. B. Goodman

Ontario

Office of the Minister

Ministry of Labour

400 University Avenue
Toronto, Ontario
M7A 1T7
(416) 965-4101

May 28, 1984

Dr. D. R. McCalla
Chairman
Advisory Council on Occupational Health
and Occupational Safety
15th Floor
400 University Avenue
Toronto, Ontario
M7A 1T7

Dear Dr. McCalla:

Thank you for your letter of April 19 responding to some of the points raised in my letter of May 18, 1983 relating to Advisory Memorandum 82-VII concerning the legal interpretation of the Act.

As to the matters addressed on page 1 of your letter, I can only repeat what I said in my letter of May 18: Ministry legal staff make every effort to interpret the Act so as to best ensure its objective: namely protection of the health and safety of the workers covered by the statute.

Since the matter is still under review, it would be premature for me to comment substantively about Council's opinion that the physical condition of the worker constitutes a sufficient reason for a refusal to work under Section 23.

I am advised that, contrary to Council's opinion, a worker is not entitled to refuse to work under Section 23(3) on purely subjective grounds. The phrase "reason to believe" has been interpreted in judicial decisions dealing with other statutes, and in the context of Section 23(3) by the Ontario Labour Relations Board and boards of arbitration to require something more than mere belief, although certainly less than "reasonable grounds" for belief required for the second stage refusal under Section 23(6).

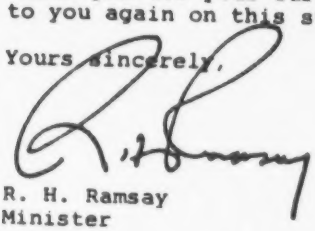
... 2

Dr. D. R. McCalla

May 28, 1984

Thank you for your further observations. I will write to you again on this subject in the near future.

Yours sincerely,



R. H. Ramsay
Minister

Office of the
Minister

Ministry
of
Labour

400 University Avenue
Toronto, Ontario
M7A 1T7
(416) 965-4101

May 8, 1984

Dr. D. R. McCalla
Chairman
Advisory Council on
Occupational Health and Safety
400 University Avenue, 15th floor
Toronto, Ontario
M7A 1T7

Dear Dr. McCalla:

On March 23, 1984 I received a copy of Advisory Memorandum 83-IV on "New Chemical and Biological Agents in the Workplace: Indentification and Control of Carcinogens and Potential Carcinogens". In an acknowledgement letter dated April 19, 1984, I indicated that I would reply more fully to the Council's advice in the near future.

A preliminary review of the Memorandum has now been completed and an important point has been raised relating to the scope of the recommendations for dealing with carcinogenic or potentially carcinogenic substances in the work place. It appears that Council's advice is limited to the identification and control of carcinogens and potential carcinogens among new chemicals, i.e. among substances requiring notification under section 21 of the Occupational Health and Safety Act, whereas, the terms of reference set out for the Special Advisory Committee on Carcinogens, the Report of this Committee, and the Discussion Paper prepared by Council all clearly suggested that advice would be forthcoming which would relate to all carcinogens.

There is no correspondence on file as to why Council chose to confine its advice to new substances and the requirements of section 21 of the Act and I would appreciate clarification of the reasons for the course of action that has been followed.

In the meantime my officials will review the recommendations for dealing with new chemicals in light of present policies and procedures under section 21. I will respond in greater detail to these recommendations upon completion of this review.

I look forward to receiving your comments.

Yours sincerely,

Russell H. Ramsay
Minister

Ontario

Advisory Council on Occupational Health & Occupational Safety

Office of the Chairman

400 University Avenue
Toronto, Ontario
M7A 1T7
416 965-2448

June 14, 1984

The Honourable R. H. Ramsay
Minister of Labour
400 University Avenue
14th Floor
TORONTO, Ontario

Dear Mr. Minister:

In response to your letter of May 8, 1984, I wish to inform you that it is Council's intention to consider the issue of identifying and regulating carcinogenic substances which are already in use in the workplace.

According to the terms of reference of the Special Advisory Committee on Carcinogens the committee was to examine the process of how best to identify, priorize and regulate carcinogens and recommend principles for developing regulations. The Special Advisory Committee consisted of scientists who prepared a background document.

Council subsequently identified a number of issues in a Discussion Paper and received briefs and oral presentations on these issues. The Discussion Paper and submissions were considered by the Task Force on Carcinogens which consisted of the Special Advisory Committee plus a labour representative and a management representative from Council. At the time of preparing Advisory Memorandum 83-IV it became clear that it would be simpler to consider new substances first. Hence, the task force developed policies and principles for new substances, recognizing that later these could be applied to substances already in the workplace.

It is acknowledged that the interpretation and application of the policies will often vary and that the procedures will be different; however, they will be based on the same principles.

We are looking forward to your comments and response to 'New Chemical and Biological Agents in the Workplace: Identification and Control of Carcinogens and Potential Carcinogens'.

Yours truly,

D. R. McCalla
Chairman

cc to: T. E. Armstrong, Q.C.
Dr. A. E. Robinson
B. Goodman

Office of the
Minister

Ministry
of
Labour

400 University Aven
Toronto, Ontario
M7A 1T7
(416) 965-4101

1984 06 28

Dr. D.R. McCalla
Chairman
Advisory Council on
Occupational Health and
Occupational Safety
400 University Avenue
15th Floor
Toronto, Ontario
M7A 1T7

Dear Dr. McCalla:

Thank you for your letter of June 14, 1984 in which you advise that it is Council's intention to consider the issue of identifying and regulating carcinogenic substances which are already in use in the workplace. I look forward to receiving your report on this difficult issue.

Council memorandum "New Chemical and Biological Agents in the Workplace: Identification and Control of Carcinogens and Potential Carcinogens" is being studied. A response is being finalized and will be forwarded when completed.

Yours sincerely,

R.H. Ramsay
Minister

Advisory Council on Occupational Health & Occupational Safety
Ontario

Conseil consultatif de la santé et de la sécurité au travail

Office of the Chairman

Bureau du président

400 University Avenue
Toronto, Ontario
M7A 1T7
416/965-2448

March 8, 1985

The Honourable R. H. Ramsay
Minister of Labour
400 University Avenue
14th Floor
Toronto, Ontario
M7A 1T7

Dear Mr. Ramsay:

In my letter of June 14, 1984 I informed you of Council's intention to consider the issue of identifying and regulating carcinogenic substances which are already in use in the workplace.

When the Task Force on Carcinogens convened, it learned that personnel in your ministry had already put considerable effort into drafting a policy paper for the control of carcinogens in the workplace. In communication with your officials it was decided that, council would provide advice to you in the form of a review of the draft policy.

I understand that the draft policy is presently undergoing internal review and I look forward to receiving a copy when it is available for review and comment.

Yours truly,

D. R. McCalla
Chairman

c.c.: T. E. Armstrong
B. Goodman
A. E. Robinson

Office of the Minister

Ministry of Labour

400 University Avenue
Toronto, Ont. M7A 1T7
416/965-4101

May 14, 1985

Dr. D. R. McCalla
Chairman
Advisory Council on Occupational
Health and Occupational Safety
400 University Avenue
15th Floor
Toronto, Ontario
M7A 1T7

Dear Dr. McCalla:

In March 1984, Council submitted to me an Advisory Memorandum entitled, "New Chemical and Biological Agents in the Workplace: Identification and Control of Carcinogens and Potential Carcinogens". This Memorandum contains recommendations relating to policies and procedures to be adopted to prevent the introduction of potentially carcinogenic new agents in the absence of proper control measures.

As you indicated in your letter which accompanied the Memorandum, Council conducted an extensive review of background information and public submissions in attempting to reconcile the often very different positions and opinions put forward by various parties on this complex topic. You will therefore appreciate the need for a careful and thorough review, by my officials, of the detailed recommendations contained in the Memorandum.

This review has identified a number of significant technical and policy issues which require further clarification and discussion before a final response can be prepared. These include:

- the recommendation that all new chemical and biological agents be tested for potential carcinogenicity prior to introduction into the work place;

- the recommendation that all toxicological data on mutagenicity and potential carcinogenicity be submitted to the Ministry as it becomes available after the pre-market notification;

- the recommendation that the Minister of Labour ensure that there is appropriate inspection of approved laboratories;

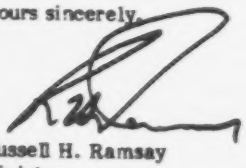
- the recommendation that new agents classified in Category 1 or 2 not be used if a suitable non-carcinogenic alternative is available; and

the recommendation that a maximum exposure limit be set at a level which, according to the best available evidence, will not cause an increased incidence of cancer in exposed workers.

I believe that a meeting between Task Force members and appropriate Ministry staff to discuss these matters would result in a better understanding of the implications of the recommendations, and would assist in the preparation of a formal response. If this course of action is agreeable, please contact Dr. Robinson to arrange the meeting.

Thank you for your cooperation.

Yours sincerely,



Russell H. Ramsay
Minister

Other Correspondence

Office of the
Minister

Ministry
of
Labour

400 University Avenue
Toronto, Ontario
M7A 1T7
(416) 965-4101

February 15, 1985,

Dr. Dennis McCalla,
Chairperson,
Advisory Council on Occupational
Health and Occupational Safety,
400 University Avenue, 15th Floor,
Toronto, Ontario,
M7A 1T7.

Dear Dr. McCalla:

In recent months there has been increasing interest in the use of biotechnology for producing new kinds of pesticides, commercial chemicals and pollution-eating substances. It would appear that it would be timely for the Ministry of Labour to consider how to ensure protection of the health and safety of workers who may be working in this field, as well as those involved in wider releases of the commercial products resulting from this area of study.

Canadian initiatives in this area include the formation of a National Advisory Committee on biotechnology chaired by Dr. John Evans, which reports to the Federal Minister of State and Technology. Dr. H.R.S. Ryan, a member of Queen's University Biohazards Committee has been commissioned by the committee to prepare a background study of legislation and regulation governing biotechnological operations.

Environment Canada has recently circulated two questionnaires on behalf of the Organization for Economic Cooperation and Development (OECD) to assist that organization in a study of safety and regulations for biotechnology. In addition, the information collected is expecteu to assist in the review of Canadian legislation referred to above.

In the United States, the Office of Science and Technology has published a policy proposal for a coordinated framework for regulating biotechnology. Already one company, Monsanto, has requested permission to field test a new pesticide which is based on a genetically altered micro organism.

2/....

February 15, 1985
Dr. Dennis McCalla

In view of the implications for occupational health and safety, as well as or as part of the environmental concerns relating to biotechnology, it seems appropriate to ensure protection of the health of all workers from the earliest stages in the development of a process involving biotechnology. Although I am advised that research work would be carried out pursuant to various voluntary codes developed by professional associations, the question arises whether these are adequate now that the benefits of these organisims are to be exploited and applied in industrial processes.

I would appreciate advice of the Advisory Council as to the policies and procedures that should be established by the Ministry of Labour to ensure the health and safety of workers as the use of biotechnology increases.

Yours sincerely,

R.H. Ramsay,
Minister

Advisory Council on Occupational Health & Occupational Safety
Ontario

Conseil consultatif de la santé et de la sécurité au travail

Office of the Chairman

Bureau du président

400 University Avenue
Toronto, Ontario
M7A 1T7
416/965-2448

May 14, 1985

The Honourable R. H. Ramsay
Minister of Labour
400 University Avenue
14th Floor
Toronto, Ontario
M7A 1T7

Dear Mr. Ramsay:

Your letter of February 15, 1985 requested council's advice on policies and procedures necessary to protect the health and safety of workers involved in the use of biotechnology. Council would like to commend you on your desire to take a proactive approach.

As biotechnology is a complex and rapidly developing field with enormous potential, council considers it necessary to briefly review the science and the activities of other jurisdictions. Of specific interest are activities directed towards assessing risks and establishing policies and procedures for notification, review and possible control of biotechnology. As a means of gathering this information, council has decided to organize a small workshop on the likely impact of biotechnology on occupational health and safety. It is anticipated that after the workshop, council will be able to assess whether or not there is a need for specific action regarding biotechnology and whether or not there is a role for council in providing advice on the establishment of policies and procedures.

Yours truly,

D. R. McCalla
Chairman

cc to: T. E. Armstrong, Q.C.
Dr. A. E. Robinson
B. Goodman

ADMINISTRATION

Legal Mandate of The Advisory Council

Section 10, the Occupational Health and Safety Act.

Advisory Council on Occupational Health and Occupational Safety
10.—(1) There shall be a council to be known as the Advisory Council on Occupational Health and Occupational Safety composed of not fewer than twelve and not more than twenty members appointed by the Lieutenant Governor in Council on the recommendation of the minister.

Term of office of members
2) The members of the advisory council shall be appointed for such term as the Lieutenant Governor in Council determines and shall be representative of management, labour and technical or professional persons and the public who are concerned with and have knowledge of occupational health and occupational safety.

Chairman and vice-chairman
3) The Lieutenant Governor in Council shall designate a chairman and a vice-chairman of the advisory council from among the members appointed.

Vacancies
4) The Lieutenant Governor in Council may fill any vacancy that occurs in the membership of the advisory council.

Remuneration and expenses
5) The remuneration and expenses of the members of the advisory council shall be determined by the Lieutenant Governor in Council and shall be paid out of the moneys appropriated therefor by the legislature.

Powers of advisory council
6) The advisory council, with the approval of the minister, may make rules and pass resolutions governing its procedure, including the calling of meetings, the establishment of a quorum, and the conduct of meetings.

Idem
7) The function of the advisory council is and it has power,
a) to make recommendations to the minister relating to programs of the ministry in occupational health and occupational safety; and
b) to advise the minister on matters relating to occupational health and occupational safety which may be brought to its attention or be referred to it.

Annual report
8) The advisory council shall file with the minister not later than the 1st day of June in each year an annual report upon the affairs of the advisory council.

Idem
9) The minister shall submit the report to the Lieutenant Governor in Council who shall cause the report to be laid before the assembly if it is in session or, if not, at the next ensuing session. 1978, c. 83, s. 10.

Primary objective of advisory council

To advise the Minister of Labour on all matters relative to occupational health and safety in Ontario.

Secondary objectives of advisory council

1. To ensure as far as is possible that the policies and programs in occupational health and safety effectively minimize the risks to health and safety in all workplaces in Ontario.
2. To ensure as far as is possible that knowledge about occupational health and safety is available to management, labour and the public and that it is understood by them.
3. To assist in promoting and establishing mechanisms involving management and labour to solve problems in occupational health and safety.
4. To ensure as far as is possible that there is appropriate manpower training and development for the occupational health and safety field.
5* To review periodically the effectiveness of the policies and programs implemented to achieve secondary objectives 1 to 4.

Terms of reference of advisory council

1. To make recommendations on matters referred to it by the minister, submitted to it by interested parties or pursued by the council on its own initiative.
2. To advise the minister on programs in the field of occupational health and safety.
3. To advise the minister on policies, principles and procedures used in standard setting and in the development of guidelines to be used by the government.
4. To review and make recommendations to the minister on the introduction of new substances such as chemicals into the workplace.
5. To review and make recommendations on the detection, measurement and control of occupational health and safety hazards in the workplace.
6. To review and make recommendations about the arrangements for occupational health and safety for groups and areas where there are no formal health and safety programs or the programs are judged to be inadequate.
7. To advise the minister on priorities for research and development in occupational health and safety.
8. To advise the minister on priorities for manpower training and development in the field of occupational health and safety.
9. To prepare an annual report to the minister, which shall include the advisory memoranda, recommendations of the council and the government response.

*added June 1980

Meetings of The Advisory Council

April 10, 1984
May 8, 1984
June 12, 1984
July 10, 1984
September 11, 1984
October 9, 1984
November 13, 1984
December 11, 1984
January 22, 1984*
February 12, 1985
March 12, 1985

* Followed by reception with minister attending and dinner with ministry officials.

TASK FORCES

TASK FORCES OF ADVISORY COUNCIL ON OCCUPATIONAL HEALTH AND OCCUPATIONAL SAFETY

TASK FORCES ON PRINCIPLES AND PROCEDURES FOR SETTING STANDARDS AND REGULATIONS

Terms of Reference
To establish guidelines by which council can determine the appropriateness of the principles, policies and procedures used in setting the standards and regulations in occupational health and safety in Ontario.
To include such things as the development of the regulations and public input about those regulations.

Members

Council Members
L. Heard – Chairman
J.W. Charters
J.M. More*
W.K.C. Morgan

Special Advisors for Regulations on

Benzene
R.T. Boldt
R.D. Fraser – Queen's University
J. Gill
L. Jolley – Consultant
D.R. McCalla
J.M. Robertson – University of Western Ontario

Acrylonitrile
D. Dewees
J. Heddle – Ludwig Institute for Cancer Research

Meetings Held
May 3, 1984
May 29, 1984**
July 4, 1984
July 4, 1984
September 5, 1984

Reports to Council
July 10, 1984
September 11, 1984

Resulting in
Advisory Memorandum 84-I
Advisory Memorandum 84-III

* Term as member of council expired October 31, 1984.
** Meeting with Ministry of Labour officials.

TASK FORCE ON THE INTERPRETATION OF HEALTH EFFECTS DATA AND THE ROLE OF ECONOMIC ANALYSIS IN THE STANDARD SETTING PROCESS*

Terms of Reference

i) a) To examine the principles and procedures which should be employed to [i] evaluate health effects data and [ii] classify and rank health effects studies.

b) To examine [i] the appropriate role for economic analysis in the standard setting process and [ii] the kinds of economic information (if any) which should be collected and analysed as part of the process for developing regulations.

c) To determine whether common principles can be applied to the interpretation and analysis of health effects and economic cost data.

ii) To examine the manner in which health effects and economic information should be integrated in the regulation of hazardous substances.

iii) To make recommendations to council in respect to these issues.

Members

Council Members

L. Heard
C.J. Tuohy

Others

R.D. Fraser – Chairman – Queen's University
G. Atherley (alternate J. Purdham) – Canadian Centre for Occupational Health and Safety
E. Farber – Banting Institute
A.L. Gladstone – Ministry of Labour (ex-officio)
L. Jolley – Consultant
R. Roberts – McMaster University

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* Inactive. See related correspondence pp 160-62 herein.

TASK FORCE ON THE ROLE OF HEALTH SURVEILLANCE AND HEALTH SCREENING IN OCCUPATIONAL HEALTH PROGRAMS

Terms of Reference

i) To identify the risks, benefits and costs of health surveillance and health screening in occupational health programs.

ii) To review the laws and procedures governing health surveillance and health screening with regard to the rights and duties of employers, employees, government and the professions.

iii) To make recommendations to the council on policies and principles governing health surveillance and health screening in occupational health programs.

Members

Council Members

J.W. Charters – Chairman (from April 10, 1984)
J.M. More*
H.D. Moyer
T. O'Connor
E. Kaegi (from April 10, 1984)

Others

T. Ison – Osgoode Hall Law School
J. Robertson – United Food & Commercial Workers International Union
D. Sackett – McMaster University

Meetings Held

June 6, 1984
July 5, 1984
August 31, 1984
September 28, 1984
November 9, 1984
December 6, 1984
January 30, 1985
March 21, 1985

Reports to Council

October 9, 1984

* Term as member of council expired October 31, 1984

TASK FORCE ON LITERACY AND OCCUPATIONAL HEALTH AND SAFETY

Terms of Reference

i) To examine the extent of the problem of illiteracy in the work force.
ii) To identify the effects of illiteracy on the effectiveness of occupational health and safety.
iii) To propose recommendations on how problems associated with illiteracy and occupational health and safety can be resolved in the short term and the long term.

Members

Council Members
W.A. Barnes*
P.A. Fisher
E.A. Waddell

Others
James Draper – OISE – Chairman
R.J. Adams – McMaster University
J. Pearpoint – Frontier College

Liaison Representatives
D. Maudsley – Ministry of Education
S. Pratt – Ministry of Citizenship and Culture

Report
Advisory Memorandum 84-IV

* Term as member of council expired October 31, 1983

TASK FORCE ON CARCINOGENS

Terms of Reference

i) To examine the principles governing the regulation development process to determine how the process can effectively and efficiently identify, prioritize and regulate carcinogens.
ii) To propose recommendations on the policies and principles governing the development of regulations for carcinogens.

Members

D.R. McCalla – Chairman
R.T. Boldt
E.A. Waddell

Meetings Held
July 12, 1984
October 1, 1984*

* Meeting with Ministry of Labour officials

TASK FORCE ON THE IMPLEMENTATION OF THE OCCUPATIONAL HEALTH AND SAFETY ACT

Terms of Reference

i) To review the application and interpretation of the Act and regulations, with particular reference to such issues as:
   - the right to refuse work
   - the role of government
   - legal interpretations
   - responsibilities regarding health and safety information.

ii) To examine the functioning of the joint health and safety committees, including the matter of access to information.

iii) To review the application and implementation of the designated substances regulations.

iv) To make appropriate recommendations.

Members

Council Members

C.J. Tuohy – Chairman
W.A. Barnes*
R.T. Boldt**
J. Duffy
P.A. Fisher***
J. Gill** ***
E. Kaegi†
T.H. Meagher**
P.L. Rooney – (from April 10, 1984)
M.A. Taschereau*
E.A. Waddell***

Others

K. Glassco – Energy & Chemical Workers Union (Polysar Ltd).
J.N. Lockington** *** † – Dofasco
C. Schmidt – United Rubber Workers of America (Uniroyal Ltd).
K. Swinton† – University of Toronto, Faculty of Law

Technical Advisory Committee
(for survey of joint health and safety committees)

Members

K. Swinton – Chairman
K. Glassco
L. Jolley – Consultant
G. Little – Dow Chemical
J. Miller – Kidd Creek Mines

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* Term as member of council expired October 31, 1983
** Member of Discussion Group on 'Right to Know'
*** Member of Subcommittee on 'Role of Government'
† Member of Subcommittee on 'Legal Interpretation'

Meetings Held

Task Force Meeting Held
June 6, 1984
October 22, 1984
February 4, 1985

Subcommittee Meetings Held
'Right to Know'*

April 9, 1984

'Role of Government'

April 16, 1984
May 11, 1984

Technical Advisory Committee

August 22, 1984
September 20, 1984
October 1, 1984
January 22, 1985
January 23, 1985
February 28 1985

Reports to Council

April 10, 1984
June 12, 1984
December 11, 1984
February 12, 1985
March 12, 1985

*Discussion Group

SCIENTIFIC TASK FORCE ON TALC

Terms of Reference
To assess the following:

i) Is there adequate evidence to correlate exposure of 'fibres', derived from silicates of the asbestos group that occur in the form of cleavage fragments, with adverse effects on health?
ii) Do the known, suspected or predicted effects on health of exposure to such fibres warrant control under the Asbestos Regulation or should a 'mineral fibre' regulation be developed?

Members
Dr. H.A. Anderson – State of Wisconsin, Madison, Wisconsin
Dr. J. Kramer – McMaster University, Hamilton
Dr. D.C.F. Muir – Chairman – McMaster University, Hamilton
Dr. P. Sebastien – McGill University, Montreal

Report
Report submitted to minister.

TASK FORCE ON CRITERIA AND ALTERNATIVE APPROACHES FOR THE CONTROL OF HAZARDOUS SUBSTANCES AND AGENTS IN THE WORKPLACE

Terms of Reference

i) To identify criteria for use in: establishing priorities for the control of hazardous substances and agents in the workplace, selecting appropriate control strategies, and establishing priorities for the development of information on which to assess need for, and evaluation of, control measures.

ii) To consider means for the systematic development of information required to apply criteria as described in i) above.

iii) To review current measures for the control of hazardous substances and agents in the workplace and to consider alternative approaches including possible modifications of the current model of designated substance regulation.

iv) To consider appropriate mechanisms for involvement of affected parties in the types of decisions and processes outlined in terms of reference i), ii) and iii) above.

v) To report and make recommendations to council with respect to these matters.

Members

Council Members
W.K.C. Morgan – Chairman
R.T. Boldt
J.W. Charters
L. Heard
E. Kaegi
T.H. Meagher
J.M. More*
C.J. Tuohy

Others
L. Jolley – Consultant

Meetings held
July 26, 1984
September 12, 1984
November 8, 1984
December 18, 1984
January 18, 1985

Reports to Council
November 13, 1984
February 12, 1985
March 12, 1985

* Term as member of council expired October 31, 1984

APPENDICES

APPENDIX A

Injuries, Permanent Disabilities and Fatalities Receiving First Payment of Compensation in 1983 by Year-End 1984, Classified by Nature of Injury

Name of Injury	*Major Permanent Disabilities*[1]		*Other Disabling Injuries*[2]		*Fatalities*[3]	
	No.	*%*	*No.*	*%*	*No.*	*%*
Amputation or Enucleation	5	1.26	611	0.42	0	0.00
Asphyxia, Strangulation, Drowning	0	0.00	0	0.00	12	6.09
Burn or Scald – Heat	1	0.25	3,416	2.32	1	0.51
Concussion – Brain, Cerebral	1	0.25	274	0.19	0	0.00
Contusion, Crushing, Bruise – Intact Skin	22	5.56	15,276	10.39	105	53.30
Cut, Laceration, Puncture – Open Wound	6	1.52	17,637	11.99	1	0.51
Dislocation	1	0.25	444	0.30	0	0.00
Electric Shock, Electrocution	0	0.00	185	0.13	8	4.06
Fracture	7	1.77	6,879	4.68	6	3.05
Hernia, Rupture	3	0.76	1,618	1.10	1	0.51
Scratches, Abrasions – Superficial Wounds	1	0.25	4,281	2.91	0	0.00
Sprains, Strains	168	42.42	40,279	27.39	0	0.00
Multiple Injuries	3	0.76	825	0.56	7	3.55
Occupational Injury, Unspecified	158	39.90	49,792	33.86	2	1.02
Occupational Injury, NEC	1	0.25	76	0.05	3	1.52
Burn – Chemical	0	0.00	918	0.62	0	0.00
Tuberculosis Only	0	0.00	4	0.00	0	0.00
Tuberculosis and Pneumoconiosis	0	0.00	1	0.00	0	0.00
Contagious or Infectious Disease, NEC	1	0.25	322	0.22	1	0.51
Dermatitis	4	1.01	563	0.38	0	0.00
Freezing, Frostbite & Other Envir. Cold	0	0.00	19	0.01	0	0.00
Hearing Loss or Impairment	0	0.00	1,381	0.94	0	0.00
Heat – Sun-Stroke – Envir. Heat	0	0.00	28	0.02	0	0.00
Bursitis	0	0.00	17	0.01	0	0.00
Synovitis, Tenosynovitis	3	0.76	375	0.25	0	0.00
Inflammation or Irritation, NEC	0	0.00	406	0.28	0	0.00
Poisoning, Systemic	1	0.25	627	0.43	3	1.52
Silicosis	0	0.00	18	0.01	2	1.02
Asbestosis	1	0.25	7	0.00	1	0.51
Pneumoconioses, NEC	3	0.76	48	0.03	1	0.51
Radiation Effects	0	0.00	594	0.40	0	0.00
Caisson's Disease	0	0.00	4	0.00	0	0.00
Occupational Illnesses, NEC	6	1.52	74	0.05	43	21.83
Non-Personal Damage	0	0.00	73	0.05	0	0.00
Unknown	0	0.00	1	0.00	0	0.00
Total	396	100.00	147,073	100.00	197	100.00

1. Includes those who received first payment of compensation in 1983 and were receiving a pension as of December 31, 1984. Major is arbitrarily defined as a permanent disability rating of 50% or greater.
2. Receiving first payment of compensation from Workers' Compensation Board in 1983.
3. Fatalities include those who received first payment of compensation in 1983 and were dead by year end 1984. These figures differ from those in the Workers' Compensation Board's record of fatalities. The difference is explained by different definitions of fatality and by different time frames used.

Source: Strategic Policy Unit, Occupational Health and Safety Division, Ministry of Labour, May 1985.

APPENDIX B

Fatality Frequency Rates per Million Man-hours and Numbers of Fatalities[1] for Major Industries in Ontario 1980, 1981, 1982 and 1983

	1980 Number of Fatalities Attributed to:			*1981 Number of Fatalities Attributed to:*			*1982 Number of Fatalities Attributed to:*			*1983 Number of Fatalities Attributed to:*		
Industry	*Occupational Disease*	*Trauma*	*Fatalities per Million Man-Hours*	*Occupational Disease*	*Trauma*	*Fatalities per Million Man-Hours*	*Occupational Disease*	*Trauma*	*Fatalities per Million Man-Hours*	*Occupational Disease*	*Trauma*	*Fatalities per Million Man-Hours*
Agriculture	1	5	0.08	0	11	0.15	2	7	0.13	1	8	0.13
Forestry	0	13	0.61	0	8	0.40	1	5	0.36	0	9	0.49
Mining; Quarrying and Oil Wells	28	24	0.74	8	11	0.26	20	10	0.40	14	5	0.26
Manufacturing	18	43	0.03	10	39	0.02	19	38	0.03	18	35	0.03
Construction	4	35	0.19	5	31	0.17	7	26	0.13	10	20	0.12
Transportation, Communication and Other Utilities	2	26	0.21	1	26	0.20	2	17	0.13	1	25	0.17
Trade	0	10	0.01	2	9	0.01	1	6	0.01	0	10	0.01
Community, Business and Personal Service	3	8	0.01	0	13	0.01	0	12	0.01	1	9	0.01
Public Administration	2	3	0.07	0	9	0.12	1	0	0.01	1	1	0.02
Others (Fishing)	0	0	0.00	0	0	0.00	0	1	0.93	0	3	2.61
All (Schedule I only)	58	167	0.05	26	157	0.03	53	122	0.04	46	125	0.03
All (Schedule II included)	64	187	—	32	174	—	56	145	—	51	146	—

1. Fatalities include those who received first payment of compensation in 1980, 1981, 1982 and 1983 and were dead by year-end 1981, 1982, 1983 and 1984 respectively. These figures differ from those in the Workers' Compensation Board's record of fatalities. The difference is explained by different definitions of fatality and by different time frames used.
2. Man-hour figures were derived from the worker's Compensation Board 'Final Accident Frequency and Cost Rate by Rate Number Report' for each year.
3. WCB rate groups have been allocated to Statistics Canada's Major Economic Divisions.

Sources. 1980 and 1981 figures - Research Branch, Ministry of Labour.
1982 figures - Canadian Centre for Occupational Health and Safety.
1983 figures - Strategic Policy Unit of the Occupational Health and Safety Division, Ministry of Labour.

APPENDIX C
Compensated Work Injury Frequency Rate per Million Man-Hours for Major Industries in Ontario, 1973-1983.

INDUSTRY	*1973*	*1974*	*1975*	*1976*	*1977*	*1978*	*1979*	*1980*	*1981*	*1982*	*1983*
Agriculture	31.29	31.25	28.41	33.81	32.28	33.52	34.84	36.00	36.08	35.81	40.30
Forestry and Logging	107.19	98.75	79.35	70.30	79.05	85.91	79.46	82.39	83.82	74.00	89.84
Mining, Quarries and Oil Wells	49.92	58.93	63.66	68.32	63.65	53.24	47.12	62.12	56.23	45.84	45.44
Manufacturing	33.79	35.18	32.09	34.00	33.90	34.05	37.25	38.67	36.88	29.92	30.51
Construction	60.72	58.07	51..7	64.02	62.11	62.16	65.57	74.88	68.68	49.04	49.55
Transportation and Communication	58.37	55.56	50.93	55.27	55.71	57.16	64.05	65.27	62.05	53.75	53.00
Trade, Wholesale and Retail	18.82	18.73	16.92	18.05	18.09	18.35	18.96	19.15	18.16	16.92	17.29
Services	11.33	11.11	9.67	19.73	19.84	19.88	21.81	23.71	22.76	18.96	19.91
Hospital	8.75	9.41	8.56	9.16	9.23	8.82	9.78	10.43	10.67	7.87	7.20
Teaching	10.96	10.47	9.36	10.29	10.57	10.61	11.53	12.61	11.91	12.44	13.17
Other	31.13	28.61	27.71	30.43	31.70	31.11	32.32	33.82	31.17	32.78	33.56
Public Administration	51.92	37.53	40.85	33.51	37.49	38.20	24.25	35.70	28.16	31.75	39.20
Others (Fishing)											
All Industries (Schedule I)	28.72	28.95	25.73	29.02	28.40	28.07	29.89	31.17	29.37	25.09	25.66

1. Man-hour figures were derived from the worker's Compensation Board 'Final Accident Frequency and Cost Rate by Rate Number Report' for each year.
2. WCB rate groups have been allocated to Statistics Canada's Major Economic Divisions.

Sources: 1973 to 1981 figures - Research Branch, Ministry of Labour.
1982 figures - Canadian Centre for Occupational Health and Safety.
1983 figures - Strategic Policy Unit of the Occupational Health and Safety Division, Ministry of Labour.

APPENDIX C-1
Number of Compensated Work Injuries for Major Industries in Ontario 1973-1983

INDUSTRY	*1973*	*1974*	*1975*	*1976*	*1977*	*1978*	*1979*	*1980*	*1981*	*1982*	*1983*
Agriculture	2,154	2,218	2,059	2,145	2,178	2,419	2,481	2,726	2,703	2,474	2,874
Forestry and Logging	2,118	2,256	1,540	1,206	1,449	1,721	1,784	1,786	1,663	1,222	1,655
Mining, Quarries and Oil Wells	4,111	5,084	5,654	6,234	5,480	3,877	3,183	4,451	4,056	3,419	3,315
Manufacturing	68,381	75,043	66,663	70,809	68,676	69,161	79,000	77,272	73,924	62,349	62,016
Construction	18,306	19,026	16,959	18,933	16,791	15,538	15,162	15,161	14,562	12,480	12,465
Transportation and Communication	7,328	7,639	6,880	7,421	7,511	7,703	8,525	8,581	8,403	7,924	7,967
Trade, Wholesale and Retail	11,414	12,593	11,752	12,932	12,835	13,243	14,472	14,652	14,452	13,391	13,737
Services											
Hospital	4,722	5,096	5,144	5,150	5,500	5,592	6,278	7,005	7,334	7,377	7,654
Teaching	588	624	585	904	1,180	1,121	1,172	1,103	1,156	1,237	1,237
Other	7,841	8,222	8,072	9,190	9,687	10,028	11,414	12,648	12,526	12,295	12,961
Public Administration	2,264	2,232	2,431	2,615	2,892	2,829	2,694	2,504	2,335	2,449	2,714
Others (Fishing)	49	34	35	28	31	36	27	37	35	34	45
All Industries (Schedule I)	129,276	140,067	127,774	137,567	134,210	133,268	146,192	147,926	143,139	126,647	128,646

1. Man-hour figures were derived from the worker's Compensation Board 'Final Accident Frequency and Cost Rate by Rate Number Report' for each year.
2. WCB rate groups have been allocated to Statistics Canada's Major Economic Divisions.

Sources: 1973 to 1981 figures – Research Branch, Ministry of Labour.
1982 figures – Canadian Centre for Occupational Health and Safety.
1983 figures – Strategic Policy Unit of the Occupational Health and Safety Division, Ministry of Labour

APPENDIX D

Injuries Receiving Compensation in 1983 by Occupation and Frequency per 100 Employees Covered by the Workers' Compensation Board of Ontario

Occupation[1]	*Disabling Injuries 1983*[2]	*Estimated Employment Covered by WCB (000)*[3]	*Estimated Injuries per 100 Employees Covered by WCB*
Managerial	697	368	0.19
Natural Sciences	1,087	146	0.74
Social Sciences	737	65	1.13
Religion	5	11	0.04
Teaching	976	171	0.57
Medicine and Health	5,900	178	3.31
Artistic and Recreational	374	70	0.53
Clerical	9,171	681	1.35
Sales	4,359	411	1.06
Services	17,331	492	3.52
Agriculture	2,884	91	3.17
Fishing, Hunting, Trapping	43	1	4.30
Forestry and Logging	1,469	13	11.30
Mining and Quarrying	1,636	15	10.91
Processing	10,341	132	7.83
Machining	11,912	101	11.79
Product Fabricating	20,952	371	5.65
Construction Trades	14,015	187	7.49
Transport, Equipment Operation	11,058	126	8.78
Materials Handling	8,315	104	8.00
Other Crafts and Equipment	1,684	55	3.06
Not Stated	10,147	—	—
Occupations, NEC.	12,573	—	—
Total	147,666	3,789	

1. From the Canadian Classification and Directory of Occupations.
2. Those receiving first payment of compensation from the Workers' Compensation Board in 1983, Schedules 1 and 2.
3. Figures are derived from Statistics Canada Labour Force Survey, 1983. WCB estimates that approximately 92.5% of the total employed labour force is covered, however it should be recognized that whereas coverage in some occupations, such as mining, may be greater than 92.5%, coverage in others, for example agriculture, is considerably less than 92.5%.

Source: Strategic Policy Unit, Occupational Health and Safety Division, Ministry of Labour, May 1985.

APPENDIX D-1

Selected Occupations Defined by Subgroup from the Canadian Classification and Dictionary of Occupations

1. *Mining* and quarrying including oil and gas field operations have the following occupational groups included: foremen, rotary well-drilling, other rock and soil drilling, blasting, cutting, handling and loading, labouring and other elemental work, and not elswhere classified (NEC).

2. *Machining* and related occupations have these groups included: foremen *metal machining*: tool and die making, machinist and machine tool setup, machine tool operating; *metal shaping and forming*: forging, sheet metal workers; welding and flame cutting, boilermakers, platers and structural metal workers; foremen *wood machining*: wood pattern making, wood sawing and related work, wood sanding; foremen *clay, glass and stone and related materials*: cutting and shaping, abrading and polishing; foremen *other machining* and related work, engravers and etchers, filing, grinding, buffing, cleaning and polishing work, inspecting, testing, grading and sampling occupations.

3. *Forestry* includes these groups of occupations: foremen forestry and logging, forestry conservation, timber cutting, log hoisting, sorting, moving, labouring, forestry and logging NEC, log inspecting, grading and scaling.

4. *Materials handling* has these occupations grouped together: foremen materials handling NEC, hoisting operations NEC, longshoremen, stevedores and freight handlers, materials handling equipment operators NEC, packaging, labouring in materials handling work.

5. *Processing* occupations are composed of: *mineral ore*: treating, crushing and grinding, mixing, filtering, melting and roasting; *metal processing*: smelting, converting and refining, metal heat treating, metal rolling, moulding, coremaking and metal casting, metal extruding and drawing, plating and metal spraying: *clay, glass and stone* furnacemen and kilnmen, separating, grinding, crushing and mixing, forming; *chemicals, petroleum, rubber, plastic and related materials:* mixing and blending, filtering, straining and separating, distilling, subliming and carbonizing, coating and calendarizing; *food, beverage and related*: flour and grain milling, baking, confectionery making, slaughtering and meat cutting, canning, curing and packing, fish canning, curing and packing, fruit and vegetable canning, preserving and packing, milk processing, sugar processing, beverage processing; *Wood*: sawmill sawyers, plywood making, wood treating; *Pulp and paper making*: cellulose preparing, papermaking and finishing; *Textiles*: fibre preparing, spinning, winding, weaving, knitting, bleaching, finishing; *Other*: tobacco, hide and pelt. Foremen, inspecting, testing and grading, elemental labour in all above groups.

6. *Transportation and Equipment* operating occupations have the following sub-groups: air transport, railway transport, water transport, motor transport and the specific occupations in each.

7. *Construction* has these sub-groups: excavating, grading and paving, electrical power, lighting and wire communications equipment erecting, installing and repairing and construction trades—carpenters, brick and stone masons, concrete finishing, plasterers, painters and paper hangers, insulating, roofing, pipe-fitting, structural metal erectors, glazers. Foremen inspecting, testing, grading and sampling, and elemental labour are included in the above where appropriate.

8. *Product fabricating* classification is composed of: metal products; electrical, electronic and related equipment; wood products; textile, fur and leather products; rubber, plastic and related products; mechanics and repairmen except electrical; and other: jewellery and silverware, marine craft, paper products, and painting and decorating.

APPENDIX E
Temporary Total Days Lost Up to and Including Initial Settlement for Industries in Ontario 1979-1983[1]

	1979	*1980*	*1981*	*1982*	*1983*
	(000)	*(000)*	*(000)*	*(000)*	*(000)*
Agriculture	67.1	69.0	77.4	86.1	93.9
Forestry	41.2	40.6	44.6	49.8	69.8
Fishing/Trapping	0.5	0.6	0.5	0.4	1.6
Mines, Quarries and Oil Wells	132.5	111.4	108.9	134.4	180.9
Manufacturing	1433.4	1460.2	1582.9	1714.8	1896.7
Construction	563.5	550.4	615.0	636.7	810.5
Transportation, Communications and Other Utilities	305.2	300.8	340.3	409.3	468.1
Trade	434.3	433.7	486.9	526.5	582.8
Services*	434.0	446.4	538.4	620.6	699.3
Public administration	265.6	265.4	293.7	276.9	295.0
Unknown	—	—	1.0	—	1.0
Total**	3677.3	3678.4	4089.5	4455.4	5099.6

* Services includes SIC categories Finance, Insurance, Real Estate and Community, Business and Personal Services.

** Total may not add due to rounding of the data.

1 Shows days lost for temporary total disabling injuries, up to and including date of initial settlement for claims initially settled in year indicated, by SIC Industry. Days lost for fatalities (permanent total) and for medical-aid only and light duty (temporary partial) are not included.

Source: Canadian Centre for Occupational Health and Safety – March 1985 from WCB's Initial Settlement System.

Note: Industry categories in Table E are based on Standard Industrial Classification groupings and differ from industry categories shown in Table B, C, and C-1 which are based on WCB rate groups.

APPENDIX F
Temporary Total Days Lost Up to and Including Initial Settlement by Occupation in Ontario 1979-1983[1]

	1979	*1980*	*1981*	*1982*	*1983*
	(000)	*(000)*	*(000)*	*(000)*	*(000)*
Managerial, Professional	20.9	24.3	22.8	21.6	23.3
Natural Science	18.1	19.7	18.4	22.6	30.8
Social Science	8.9	10.2	13.0	12.4	12.6
Religion	*	*	0.4	0.2	0.9
Teaching	8.5	9.7	12.9	11.3	16.0
Medicine and Health	102.4	99.7	117.6	149.9	163.4
Artistic and Recreational	5.1	5.0	7.0	9.8	8.4
Clerical	149.1	138.0	162.8	171.3	199.9
Sales	83.9	88.4	103.6	101.5	122.0
Service	341.0	344.6	381.4	431.0	487.4
Agriculture	78.1	83.2	85.3	97.3	101.2
Fishing, Hunting, Trapping	1.3	0.4	0.6	1.0	0.9
Forestry and Logging	54.2	52.8	59.1	61.4	78.0
Mining and Quarrying	79.8	71.4	70.2	80.2	114.6
Processing	268.3	279.4	289.3	319.0	350.3
Machining	341.0	352.5	363.4	382.6	401.8
Product Fabricating	531.9	540.3	599.2	649.3	713.7
Construction Trades	567.4	549.6	600.0	629.8	798.4
Transport Equipment Operation	321.7	302.0	342.4	376.0	432.6
Material Handling	194.2	201.9	233.9	239.7	265.4
Other Craft and Equipment Operation	33.5	35.8	36.4	42.4	41.5
Not Stated	165.2	177.2	244.0	295.3	364.1
Occupation, NEC	302.7	292.1	325.3	349.8	372.3
Totals**	3677.3	3678.4	4089.5	4455.4	5099.6

* Days lost less than one hundred.

** Totals may not add up due to rounding of the data

1 Shows days lost for temporary total disabling injuries, up to and including date of initial settlement for claims initially settled in year indicated, by 2 digit CCDO occupation. Days lost for fatalities (permanent total) and for medical-aid only and light duty (temporary partial) are not included.

Source: Canadian Centre for Occupational Health and Safety – March 1985 from WCB's Initial Settlement System.

APPENDIX G
Temporary Total Days Lost Up to and Including Initial Settlement by Nature of Injury in Ontario 1979-1983[1]

	1979	1980	1981	1982	1983
	(000)	(000)	(000)	(000)	(000)
Amputation, enucleation	53.3	56.3	61.1	64.8	54.7
Asphyxia, strangulation, drowning	*	*	*	*	*
Burn, scald	48.9	51.4	49.0	51.1	46.9
Concussion	17.2	14.4	17.5	16.7	22.3
Contusion, bruise	358.8	359.3	358.8	374.2	423.6
Cut, laceration	265.1	288.6	287.6	300.0	293.6
Dislocation	24.9	27.3	29.9	32.3	34.0
Electric shock	3.2	6.3	6.9	6.4	6.7
Fracture	463.6	511.3	467.7	500.0	524.7
Hernia, rupture	68.0	69.1	68.0	70.0	65.9
Scratches, abrasion	28.4	28.0	28.6	24.9	25.8
Sprain, strain	1498.3	1450.2	1554.1	1720.8	1937.6
Multiple injuries	79.5	92.9	96.9	99.1	124.9
Occupational injuries, unspecified	671.6	590.0	903.4	1000.0	1332.9
Occupational injuries, NEC	3.1	0.8	0.7	2.1	4.5
Burn, chemical	10.3	9.8	10.0	8.6	13.0
Tuberculosis	0.5	0.1	0.7	0.1	*
Tuberculosis and pneumoconiosis	0.5	*	*	*	0
Contagious, infectious disease, NEC	2.3	2.8	2.3	4.4	6.9
Dermatitis	13.8	12.8	10.8	13.4	17.1
Freezing, frost-bite	1.4	0.7	1.3	1.1	1.2
Hearing loss or impairment	0.1	*	0.1	*	*
Heat, sunstroke	0.1	*	0.1	0.2	0.1
Bursitis	1.3	0.1	0.6	0.6	1.4
Synovitis, tenosynovitis	11.6	12.5	16.0	22.2	23.3
Inflammation, irritation, NEC	5.4	5.7	9.0	9.4	13.9
Poisoning, systemic	6.1	3.9	6.7	9.0	6.9
Silicosis	*	*	0.8	*	0.1
Asbestosis	*	0.2	0.2	1.1	*
Pneumoconiosis, NEC	0.1	0.6	1.5	2.1	1.7
Radiation effects	2.9	3.1	2.7	4.5	3.4
Caisson's disease	0.1	*	*	*	0.4
Occupational illness, NEC	7.8	7.2	11.8	11.1	11.9
Non-personal damage	0.2	0.1	0.5	0.1	0.4
Preventative measures	*	*	*	*	*
Unknown	29.0	74.1	84.1	104.9	99.7
Total**	3677.3	3678.4	4089.5	4455.4	5099.6

* Days lost less than one hundred. Only days of temporary total are shown. There is no imputation for fatalities.

** Totals may not add due to rounding of the data.

1 Shows days lost for temporary total disabling injuries, up to and including date of initial settlement for claims initially settled in year indicated, by nature of injury. Days lost for fatalities (permanent total) and for medical-aid only and light duty (temporary partial) are not included.

Source: Canadian Centre for Occupational Health and Safety – March 1985 from WCB's Initial Settlement System.

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